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Army space and transformation

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THESIS

ARMY SPACE AND TRANSFORMATION

by

Clay S. Scherer

September 2005

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The Army is undergoing a Transformation process, the outcome of which will be an enhanced warfighting capability via the Objective Force. Space is a key enabler for the Army's Objective Force capabilities and Joint combat operations. The Army has a long history of success in the space mission area that stretches back to the 1940s. The Army established doctrine for conducting space operations in support of the Objective Force. This thesis explains why the Army is involved in space from historical, doctrinal and policy perspectives.

The Army created force structure for Space Support Elements (SSE) at the tactical level and organic to Division headquarters, and has planned and proposed additional space elements at the Brigade, Corps and Army organizational levels. The FA40, (Space Operations), Career Field is a relatively new personnel category that brings space products and services to the warfighter. Proper distribution of the FA40 personnel pool is a critical part of assuring the success of the FA40 Career Field. This thesis presents recommendations on how the Army can better organize its space force structure, allocate personnel and develop future space capabilities requirements documents to ensure relevancy in a transformed Army.

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ARMY SPACE AND TRANSFORMATION

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Submitted in partial fulfillment of the
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ABSTRACT

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TABLE OF CONTENTS

LIST OF FIGURES

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LIST OF TABLES

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LIST OF ACRONYMS

3D	Three Dimensional
AAF	Army Air Field
ABMA	Army Ballistic Missile Agency
AD	Armor Division
ADA	Air Defense Artillery
AFB	Air Force Base
AFSCN	Air Force Satellite Control Network
AFSPACE	Air Force Space Command
AFSPC	Air Force Space Command
AoA	Analysis of Alternatives
AOC	Area of Concentration
AOMC	Army Ordnance and Missile Command
ARCENT	Army Component, Central Command
ARFOR	Army Forces Component
ARNORTH	Army Component, Northern Command
AROC	Army Requirements Review Council
ARSPACE	Army Space Command
ARSST	Army Space Support Team
ARSTRAT	Army Strategic Command
ASCC	Army Service Component Command
ASPO	Army Space Program Office
AW	Air Wing
AwarE	Advanced Warfighting Environment
BCT	Brigade Combat Team
BDA	Battle Damage Assessment
BDE	Brigade
BFSB	Battlefield Surveillance Brigade
BMD	Ballistic Missile Defense
BMDO	Ballistic Missile Defense Organization
BN	Battalion
C2	Command and Control
C2PC	Command and Control Personal Computer
C4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance
CADD	Combined Arms Doctrine Directorate
CAS	Committee on Armed Services
CDD	Capabilities Development Document
CDR	Commander
CENTCOM	Central Command
CET	Commercial Exploitation Team
CF	Career Field
CG	Commanding General

CINCNORAD	Commander in Chief, North American Aerospace Defense Command
CINCSPACE	Commander in Chief, United States Space Command
CJCSM	Chairman of the Joint Chiefs of Staff Manual
Cmd	Command
CMD GRP	Command Group
CMD GRP	Command Group
CMD LNO	Command Liaison
COL	Colonel
CONOPS	Concept of Operations
COPS	Contingency Operations – Space
COTS	Commercial Off the Shelf
CP	Command Post
CP1	Command Post #1
CP2	Command Post #2
CPD	Capabilities Production Document
CPT	Captain
CSA	Chief of Staff, Army
DA	Department of the Army
DA Pam	Department of the Army Pamphlet
DCD	Directorate of Combat Developments
DCG	Deputy Commanding General
DCG-O	Deputy Commanding General, Operations
DCG-RDA	Deputy Commanding General, Research, Development and Acquisition
DCG-SO	Deputy Commanding General, Space Operations
DIV	Division
DMSP	Defense Meteorological Satellite Program
DoD	Department of Defense
DOTMLFP	Doctrine, Organizations, Training, Materiel, Leadership and Education, Facilities and Personnel
DSCS	Defense Satellite Communications System
DSP	Defense Support Program
EAC	Echelons above Corps
EHF	Extremely High Frequency
ELT	Electronic Light Table
EN	Enlisted
EUCOM	European Command
FA24	Functional Area 24, Information Systems Engineering
FA30	Functional Area 30, Information Operations
FA34	Functional Area 34, Strategic Intelligence
FA39	Functional Area 39, Psychological Operations (PSYOP) and Civil Affairs

FA40	Functional Area 40, Space Operations
FA43	Functional Area 43, Human Resources Management
FA45	Functional Area 45, Comptroller
FA46	Functional Area 46, Public Affairs
FA47	Functional Area 47, USMA Permanent Instructor
FA48	Functional Area 48, Foreign Area Officer
FA49	Functional Area 49, Operations Research/Systems Analysis
FA50	Functional Area 50, Force Management
FA51	Functional Area 51, Army Acquisition Corps
FA52	Functional Area 52, Nuclear Research and Operations
FA53	Functional Area 53, Information Systems Management
FA57	Functional Area 57, Simulation Operations
FA59	Functional Area 59, Strategic Plans and Policies
FA90	Functional Area 90, Multifunctional Logistician
FCS	Future Combat System
FDU	Force Design Update
FE	Force Enhancement
FM	Field Manual
FORMAL	Force and Management Analysis
FWC	Future Warfare Center
GMD	Ground-based, Mid-Course Defense
GPS	Global Positioning System
GR	Grade
GSSC	Global Satellite Support Center
HCS	Human Capital Strategy
HELSTF	High Energy Laser Systems Test Facility
HHC	Headquarters, Headquarters Company
HLS	Homeland Security
HMMWV	Highly Mobile Multi Purpose Wheeled Vehicle
HQ	Headquarters
ICBM	Intercontinental Ballistic Missile
ICD	Initial Capabilities Document
ID	Infantry Division
IG	Inspector General
INMARSAT	International Maritime Satellite
INT REV	Internal Review
INTEL	Intelligence
IO	Information Operations
IPB	Intelligence Preparation of the Battlefield
IPSAT	Internet Protocol Satellite
IRBM	Intermediate Range Ballistic Missile
ISAT	Intelligence Situational Awareness Tool

ISR	Intelligence, Surveillance, Reconnaissance
JBFSA	Joint Blue Force Situational Awareness
JCIDS	Joint Capabilities Integration Development System
JCS	Joint Chiefs of Staff
JFC	Joint Functional Concept
JFCC	Joint Functional Component Command
JFCC-IMD	Joint Functional Component Command – Integrated Missile Defense
JFCC-NW	Joint Functional Component Command – Network Warfare
JFCC-S&GS	Joint Functional Component Command – Space and Global Strike
JFCOM	Joint Forces Command
JFRL	Joint Forces Restricted Frequency List
JIC	Joint Integrating Concept
JIM	Joint, Interagency and Multinational
JOC	Joint Operating Concept
JOpsC	Joint Operations Concepts (Overarching)
JP	Joint Publication
JROC	Joint Requirements Review Council
JTAGS	Joint Tactical Ground Station
JTF	Joint Task Force
JTIDS	Joint Tactical Distribution System
JV	Joint Vision
KW	Kilowatt
LTC	Lieutenant Colonel
M&S	Modeling and Simulation
M3P	Multi-Mission Mobile Processor
MACOM	Major Command
MAJ	Major
MCG	Mobile Command Group
MCO	Major Combatant Operations
MDA	Milestone Decision Authority
MDA	Missile Defense Agency
MDP	Military Decision Process
MEF	Marine Expeditionary Force
METL	Mission Essential Task List
MNS	Mission Need Statement
MNVR EN	Maneuver Enhancement
MOS	Military Occupational Skill
MS A	Milestone Decision A
MS B	Milestone Decision B
MS C	Milestone Decision C
MTOE	Modified Table of Organization and Equipment
NASA	National Aeronautics and Space Administration

NCO	Non-commissioned Officer
NETWARCOM	Network Warfare Command
NNSOC	Naval Network and Space Operations Command
NORAD	North American Aerospace Defense Command
NORTHCOM	Northern Command
NRO	National Reconnaissance Office
NSOC	Naval Satellite Operations Center
NSSO	National Security Space Office
NW	Network Warfare
OB	Order of Battle
OFF	Officer
ONS	Operational Needs Statement
OPCON	Operational Control
OPTEMPO	Operational Tempo
OSD	Office of the Secretary of Defense
PACOM	Pacific Command
PAO	Public Affairs Office
PEO	Program Executive Office
PLI	Marine Corps Information Operations and Space Integration Branch
POM	Program Objective Memorandum
PROV	Provisional
PVNT	Position, Velocity, Navigation and Timing
QTY	Quantity
R&D	Research and Development
RC	Reserve Component
RDA	Research, Development and Acquisition
RSSC	Regional Satellite Support Center
RSTA	Reconnaissance, Surveillance, Target Acquisition
S&A	Simulation and Analysis
S&GS	Space and Global Strike
S&T	Science and Technology
SA	Situational Awareness
SATCOM	Satellite Communications
SATCON	Satellite Control
SATURN	Space Applications Technology Utility Reachback Node
SBIRS	Space-Based Infrared System
SBMCS	Space Battle Management Core System
SC	Space Control
SCA	Space Coordinating Authority
SD	Strategic Defense
SDD	System Development Demonstration
SEWD	Space and Electronics Warfare Detachment
SGT	Sergeant

SJA	Staff judge Advocate
SJFHQ	Standing Joint Force Headquarters
SMAT	Space and missile Analysis Tool
SMDC	Space and Missile Defense Command
SO	Stability Operations
SOCOM	Special Operations Command
SOO	Space Operations Officer
SOOQC	Space Operations Officer Qualification Course
SORC	Spectral Operations Resource Center
SOS	Space Operating System
SOUTHCOM	Southern Command
SPACECOM	Space Command
SPACECOM	Space Command
SPT CO	Support Company
SSDC	Space and Strategic Defense Command
SSE	Space Support Element
SSET	Space Support Element Toolset
SSETv2	Space Support Element Toolset Version 2
SSG	Staff Sergeant
STB	Special Troops Battalion
STK	Satellite Tool Kit
STRATCOM	Strategic Command
SUST	Sustainment
SW	Space Wing
T&E	Test and Evaluation
TDDS	TRAP Data Dissemination System
TENCAP	Tactical Exploitation of National Capabilities Program
TES	Theater Event System
TIBS	Tactical Information Broadcast System
TIM	Technology Information Management
TMW	Theater Missile Warning
TP	TRADOC Pamphlet
TPPU	Tasking, Posting, Processing and Utilization
TRADOC	Training and Doctrine Command
TRADOC PAM	Training and Doctrine Command Pamphlet
TRANSCOM	Transportation Command
TRAP	Tactical Related Applications
TSM	TRADOC System Manager
TT&C	Telemetry, Tracking and Command
TTP	Tactics Techniques and Procedures
UA	Unit of Action (Brigade Equivalent)
UCP	Unified Command Plan
UEx	Unit of Employment (Division Equivalent)
UEy	Unit of Employment (Corps Equivalent)

UHF	Ultra High Frequency
UK	United Kingdom
USAEUR	Army Component, European Command
USAF	United States Air Force
USAKA	United States Army, Kwajellin Atoll
USARPAC	Army Component, Pacific Command
USARSO	Army Component, Southern Command
USASDC	United States Army Strategic Defense Command
USASMDC	United States Army Space and Missile Defense Command
USFK	United States Forces, Korea
USMA	United States Military Academy
USSPACECOM	United States Space Command
USSTRATCOM	United States Strategic Command
VAFB	Vandenberg Air Force Base
WO	Warrant Officer
WTEM	Weather, Terrain and Environmental Monitoring

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I. INTRODUCTION

The United States Army began a sweeping Transformation process in the late 1990's. The goal of Army Transformation is to field an Objective Force. "The Objective Force is our future full spectrum force: organized, manned, equipped, and trained to be more strategically responsive, deployable, agile, versatile, lethal, survivable, and sustainable across the entire spectrum of military operations from major theater wars through counter terrorism to homeland security."[1]

The Army has identified space operations as a key enabler to combat operations today and even more so in the future. The Objective Force will rely on space operations for success on the battlefield. "Terrestrial systems alone will not enable full-spectrum dominance. The Army views space as a vertical extension of the battlefield, and space capabilities are key force multipliers for land force operations."[2] The Army has become increasingly dependent on space-based products and services.

The Army has been active in space for more than 50 years and has often had a leading role in the military's successes in this mission area. The focus of today's Army space activity is to embed space support in the emerging Objective Force. Army space operators are in Space Support Elements organic to the Division level, organic to Corps headquarters as Space Operations Officers and attached as Army Space Support Teams to Joint and Service commands as directed. The Army's space expertise comes from a small number of "Space Cadre". The core of the Army's Space Cadre is roughly 150 officers that make up the Space Operations Career Field.

The Army's 1st Space Brigade is an operational unit that provides space support to Joint, Service and Multi-national operations through the attachment of various space elements. However, for Army Space operations to remain a relevant combat multiplier it must be clearly linked to the Army Transformation effort. The focus of Army

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1 Rumsfeld, Donald H. Annual Report to the President and the Congress [database online] (2002 [cited 18 August 2005]}); available from World Wide Web @ http://www.defenselink.mil/execsec/adr2002/, 122.

2 Annual Report to the President and the Congress, 123.

Transformation is the Objective Force. Accordingly, Space Operations Officers and space support activities must focus on support to the Objective Force. This focus resulted in the formation of Space Support Elements organic at the Division level in the Objective Force. If space is not clearly part of the Objective Force it will not emerge from the Transformation process as a critical enabler.

This paper will address why the Army is involved in space from historical, doctrinal and policy perspectives. After looking at the current Army space force structure, space missions, and Army Transformation; the inclusion of space forces in this Transformation process will be detailed. The primary takeaway is to understand the units that are emerging from the Transformation process and know how Army space elements are designed to support them.

The current and planned Army Space force structure will be explained and what tasks and capabilities they are expected to provide. A principal issue is at what level and to what strength should space elements be embedded in the Objective Force organizations. The trade-offs and differences between the Army Space Support Teams (ARSST) at the 1st Space Battalion and the Division-organic Space Support Elements (SSE) will be discussed.

The FA40 Career Field is a relatively new personnel category and the development of the FA40 community will be explained. Personnel requirements and a proper distribution of the low-density FA40 community is a critical part of assuring success of the FA40 Career field, as well as the success of Army and Joint Space Operations.

A brief review of what equipment the ARSST, SSE and other Space Battalion assets utilize will be included. The operational requirements documents that are required to equip space forces will be assessed. Future systems that will equip future space forces will also be reviewed. In depth equipment capabilities and parameters will not be covered. A brief listing of the equipment used by the Army's space forces to perform their mission sets will be identified.

The different Service-unique perspectives of organizing space forces and organizations will be detailed. Differences in operational space focus, force structure and

personnel requirements will be contrasted. The emergence of a U.S. Space Force will also be discussed. Lastly, recommendations for how the Army can reorganize its force structure, allocate personnel and develop future space capabilities requirements documents will be presented.

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II. THE ARMY AND SPACE

A. OVERVIEW

The Army has been involved in Space for more than fifty years. This chapter will outline the Army's history in Space and establish how and why the Army became involved in the nation's space operations. The United States Army Space and Missile Defense Command can trace the marriage of these two mission areas back to technology development that occurred decades ago. This relationship between the Army's Space and Missile Defense communities still exists today.

The Army Space forces can trace their current organization to a rich history of Service space experience, Joint/Service Space doctrine, and National, Joint and Service Space policies. It is important to understand the Army's perspective on space, the existing Space forces and their doctrinal foundations to be able to trace the inclusion of space operations elements in the Army's changing force structure. Section D of this chapter will follow the evolution of Army space policy and doctrine. This changing doctrine resulted in an expanded Space mission area. The Army's operational space force structure reflects this expanded space mission. Doctrine and policy are the foundation for operational forces. Understanding Service and Joint policy and doctrine is necessary to understand Army space.

The Army has an operational 1st Space Brigade. The Brigade supports Joint and Service operations worldwide. This chapter will look at the existing Army Space units, their construct and missions. It is important to know the Army's current space units and their roles in order to understand how the Army Space will allocate and position space operators in the emerging Objective Force, the Army's 21st Century fighting force.

B. THE ARMY'S HISTORY IN SPACE

> In the 20th Century, the Army fully exploited the high ground provided by air capabilities and led the nation to space. In the 21st Century we must fully exploit the high ground of space to empower adaptive leaders and soldiers with the ability to see first, understand first, act first and finish decisively.[3]

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3 Department of the Army, Army Space Policy, par 18 (April 2003 [cited 17 May 2005]); available from World Wide Web @ http://www4.army.mil/FA40/data/files/pdf/armySpacePolicy.pdf

The Army has a long history of work in the space mission area that rivals their sister Services and dates back over 50 years. The Army became involved in space technology development shortly after World War II. In 1945, German scientist, Werner von Braun, and over 100 missile development experts were removed from Germany and placed under the supervision of the Army at Fort Bliss, Texas. Known as Operation Paperclip, the Army and von Braun's team of scientists "provided valuable information about the design and construction of missiles and rockets which had application to both the tactical weapon and space vehicle arenas."[4]

By 1949, Dr von Braun and his cohorts launched the Bumper Round 5 rocket, which was the first missile to reach outer space. Shortly thereafter von Braun and the Army Ordnance Rocket Research and Development Division moved from Fort Bliss, Texas to Redstone Arsenal in Huntsville, Alabama. The Redstone Arsenal was designated the Army's Ordnance Rocket Center. In 1952, the Ordnance Rocket Center produced the first Redstone missiles.[5] The Redstone missile would be the springboard for the first U.S. satellite in space. The linkage established between space, missiles and Redstone Arsenal still exists today in the Army's space structure and doctrine. This space and missile commonality will be addressed later in the paper.

Although the initial focus of Operation paperclip was the development of an IRBM, the Bumper Round 5 launch into space and the Redstone missile would evolve this long-range missile technology into the first satellite launch vehicle. As early as 1954, von Braun wrote a thesis that "proposed using the Redstone missile as the main booster of a four-stage rocket for launching artificial satellites."[6] This plan later became the joint Army-Navy effort called Project Orbiter.

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4 Hughes, Kayleen, Dr. "Pioneering Efforts on Space," par. 2 [U.S. Army Missile Command Historical Office website] (1990 [cited 8 May 2005]); available from World Wide Web @http://www.redstone.army.mil/history/pioneer/welcome.html

5 Redstone Arsenal Military History Office, "The Army at Redstone Arsenal: Significant Accomplishments in Space, 1948 to 1961" par. 8 [Redstone Arsenal website] (cited 8 May 2005); available from World Wide Web @ http://www.redstone.army.mil/history/arspace/arspace_chronology.html

6 Hughes, par. 5.

The Navy was developing a plan to put a satellite into space using the Viking missile. This Navy effort was called Project Vanguard. The Army developed a concurrent plan based on the Jupiter missile. The Army's Jupiter missile evolved from the Redstone and the addition of upper stage rockets. In July 1955, President Eisenhower "announced that the United States would undertake the construction of man-made satellites."[7] This decision would test the work done by Operation Paperclip, Project Vanguard and Project Orbiter and ultimately put the Army at the pinnacle of the U.S. space effort.

In 1955, the Navy became the chair of the Secretary of Defense's Ballistic Missile Committee. Soon after, the Navy's Project Vanguard was chosen to carry out the Presidential announcement of U.S. satellite launch. The Army Ballistic Missile Agency (ABMA) was activated at Redstone Arsenal in February 1956. The ABMA mission was specifically military in nature; develop the first IRBM for the Army. The Army's work with the Jupiter missile and satellite launch continued however under "special orders" but never became part of the ABMA's assigned mission. The Office of the Secretary of Defense (OSD) consistently told the ABMA from May 1956 to May 1957 that there was no plan for the Jupiter missile to launch a satellite. Consequently, ABMA conducted no preparation to use a Jupiter missile as a satellite launch vehicle.[8]

In the fall of 1957 the Soviet Union won the race to space. Sputnik I was successfully launched in October and Sputnik II followed in November. The Navy's Project Vanguard was not able to follow the Soviets into space and the Secretary of the Army submitted a proposal to OSD for satellite launch on a Jupiter C missile. OSD directed the Army on 22 November 1957 to launch a Jupiter C satellite. Seventy days later, the Army's Jupiter C missile successfully placed the Explorer I satellite into orbit on 31 January 1958.[9]

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7 "Significant Accomplishments in Space," par. 13.

8 Walker, James, Dr., Bernstein, Lewis, Dr. and Sharon Long. *Seize the High Ground: The Army in Space and Missile Defense*. (Washington, D.C.: US Government Printing Office, 2003), B4-B5.

9 Hughes, par. 7.

Over the next two and a half years, the ABMA recorded amazing accomplishments in space launch and development. The Pioneer III and IV spacecraft lunar probes traveled into space on Jupiter C launch vehicles in December 1958 and March 1959 respectively. The ABMA put four additional Earth-orbiting satellites into space and also developed and launched the Jupiter nose cones with primates inside, proving the ability for living creatures to survive space flight. These early tests with nose cone recovery, the developmental work on the 1.5 million pound booster known as the Saturn Program, and the successful development and launch of the Mercury-Redstone missile all resulted in the first space flights of Alan Shepard and Virgil Grissom.[10]

During the months of early success in 1958, President Eisenhower had already implemented decisions that would lead to the decline of Army activities in space. In April 1958, Eisenhower recommended that a civilian agency be created to control nonmilitary space activities. Three months later the National Aeronautics and Space Administration (NASA) was established when the President signed the National Aeronautics and Space Act of 1958. The Army Ordnance and Missile Command (AOMC) was activated in 1958 at Redstone Arsenal to provide centralized control of the various space and missile programs in which the Army was involved. The ABMA was a subordinate unit within AOMC.[11]

On 1 July 1960, NASA's George C. Marshall Space Flight Center was officially opened at Redstone Arsenal. With Marshall Space Center established, the AOMC and ABMA turned over all buildings, equipment, civilian employees and space programs to NASA. This ended the Army's leadership and influence in formal space programs for over 20 years:

> Between 1961 and 1975, Vietnam turned the Army from Space and using Space-based instruments as a force multiplier. Satellites did not offer direct tactical aid to the Soldier – assisting communication was the only way Space-based assets intervened in ground fighting. Instead of thinking about Space-based assets that could be used as force or to shape future

10 *Seize the High Ground*, B8-B11.

11 Ibid., B6.

wars, the Army moved to field effective tactical weapons troops could use immediately – thinking about the future was self-indulgent luxury.[12]

The Army's reemergence in the space mission area began in 1973 with the establishment of the Army Space Program Office (ASPO). ASPO's mission was and is the development of systems and methods to leverage the Tactical Exploitation of National Capabilities Program (TENCAP) for the tactical warfighter's benefit.[13] By using the products from the national intelligence community and the national technical means (NTM) overhead systems to enhance the ability of tactical commanders, the Army began to shake off the Vietnam-era thought pattern in which development and use of space-based force multipliers for future battlefields was an unsupportable "luxury".

The incorporation of space-based products and services with the Army's military decision process (MDP) was energized by the development of the AirLand Battle Doctrine. Internal Army debate about current and emerging threats and the AirLand Battle Doctrine created a renewed interest in space by the Service's leadership. "It was then that the Army determined the ground commander's needs required it to return to space. Space-related activities offered the ground commanders unique platforms for observation, positioning, and communication over a greatly expanded battlefield."[14]

The other Services also began to refocus their attention on long range planning and investment in space programs and organizations. In 1982 and 1983, the Air Force and Navy established Air Force Space Command (AFSPC) and Naval Space Command respectively. President Reagan made public the Strategic Defense Initiative (SDI) in 1983 and this further energized Army leadership to study the potential of space in support of the warfighter and what role the Army should play in this mission area. "In August

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12 Bernstein, Lewis, Dr., "The Army and Space: 1958-1984," The *Army Space Journal*, Fall 2004, 2F.

13 "The Army and Space: 1958-1984," 2F.

14 Ibid., 3F.

1984, an Army Space Council was created in Washington to coordinate and approve proposals and provide direction for the Army's involvement in and use of Space among various functionally organized staff offices."[15]

After the Army leadership reviewed "Lessons Learned" from Operation Urgent Fury in Grenada in the fall of 1983, General Maxwell Thurman, Vice Chief of Staff of the Army, directed the establishment of an Army Staff Field Element at the Air Force Space Command headquarters.[16] This initial element would evolve into the Army Space Command (ARSPACE) and then to its current title as the U.S Army Forces Strategic Command (ARSTRAT). What started as doctrinal changes and new ways of thinking with respect to space and tactical warfighting, became Army organizations and advisory groups charged with managing the Service's space activities and developing long-term goals for the Army in the space mission area.

The Army's early Space management structure in 1984 had four elements: the Army Space Council, an Army Space Working group to support the Space Council, the Army Space Program Office (ASPO), and the Army Staff Field Element at AFSPC. The Army Space Council charged ASPO with five short-term tasks:

1) Develop an Army Space policy
2) Create an inventory of existing Army Space-related requirements and programs
3) Create immediate enhancements to key areas of Army Space involvement
4) Develop an operational concept for Space support to warfighting
5) Develop Army options for supporting a unified Space command[17]

The Army's efforts to leverage space and assist tactical commanders were energized in the early 1980's. One of the first formal steps was the establishment of the Army Space Institute at Fort Leavenworth, Kansas in 1986. The Institute was responsible for creating Army Space concepts, doctrine, training and equipment. It was also responsible for taking Space to the soldiers and tactical commanders so they would

15 "The Army and Space: 1958-1984," 3F.

16 Ibid.

17 Ibid.

know how to leverage space-based products and services. This introductory program started in 1987 was called the Army Space Demonstration Program and the Army Space Exploitation Demonstration Program. This program was the forerunner of the Army Space Support Team (ARSST). The culmination of this initial, Army-centric space capabilities development, demonstration and support was the activation of the Army Space Command in Colorado Springs, Colorado in 1988.[18]

The early demonstration programs provided more than hands-on displays to soldiers and educational platforms for Army leadership. The personnel from these early space demonstration teams deployed to support Army units during Operation Desert Storm in 1990, in Haiti in 1994 and in Bosnia in 1996 even though they were not initially designed or intended to accompany tactical units on combat missions. "After the first Gulf War, the Army Space support program was energetically developed."[19] This was partially due to the personal interest of the Army Chief of Staff, General Sullivan, who directed space support be embedded in numerous high profile Army experiments and exercises from 1992-1996.

The focus of Army senior leadership on space support to the warfighter resulted in ARSPACE developing a space support capability specifically designed to deploy in support of tactical operations. This next step in the evolution of the space demonstration teams was the Contingency Operations – Space (COPS) that ARSPACE activated in 1994.[20] The COPS space support teams were created to fill the tactical support, deployable mission. The final version of the ARSST evolved from the COPS construct. The first deployment of the modern-day ARSST in support of combat operations was in 1996 with the 1st Infantry Division in Tuzla, Bosnia.

The ARSST teams experienced ever-increasing support requirements from 1996-1998 and the concept of operations (CONOPS) for deployment of ARSST teams became

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18 Bernstein, Lewis, Dr., "Army Space Support Teams: The Early Years, 1986-1998," *The Army Space Journal*, Winter 2005, 1F.

19 "Army Space Support Teams: The Early Years, 1986-1998," 2F.

20 Ibid.

more clearly defined. Because of the heightened awareness of space support by Army leadership due to increased deployments of ARSST teams, the Army activated a new functional area, FA40 or Space Operations Officer, "to deal with the warfighting implications of Space operations from a leadership development and training perspective."[21] Prior to the activation of FA40s, Army officers from almost every branch would fill Army space billets for 2 to 3 years and then return to their respective basic branch. The majority of the officers were from the Military Intelligence, Signal and Air Defense Artillery branches. The FA40 career path enables officers to stay in the Space Career Field and remain viable for future promotions.

The Transformation of the Army in the late 1990's saw a marked change in organizational structure from the "Divisional Army" to a lighter, faster "Modular Army". Chapter III will specifically look at the details of Army Transformation and follow the emergence of the Space Support Element (SSE) and the role of the FA40 in the present day.

C. THE ARMY'S CURRENT ROLE IN SPACE

The current Army Space mission area and personnel are under the United States Army Space and Missile Defense Command (USASMDC). USASMDC or SMDC as it is commonly referred can trace its space roots to the Strategic Defense Initiative of 1983. As a result of the Strategic Defense Initiative, the United States Army Strategic Defense Command (USASDC) was established in 1985. USASDC incorporated parts of the Ballistic Missile Defense Organization (BMDO) and primarily focused on classic missile defense roles. USASDC also explored the use and development of anti-satellite weapons and this way began to taking command responsibility of the Army's initial space activities.

In 1992, the USASDC became the United States Army Space and Strategic Defense Command (USASSDC). This change corresponds to the Army leadership's reenergized interest in space. ARSPACE, formed in 1988, became a part of the

21 Army Space Support Teams: The Early Years, 1986-1998," 3F.

USASSDC. The Army Space Technology Research Office and ASPO transferred to USASSDC in 1993 and 1994 respectively, and USASSDC is designated the Army's advocate for space.[22]

In 1997, the USASSDC was reflagged as the United States Army Space and Missile Defense Command (USASMDC). SMDC was also the Army Service Component Command (ARSPACE) to the United States Space Command (SPACECOM) at this time. Note that the original ARSPACE organization founded in 1988 was not the Service Component Command to the SPACECOM; it was a liaison element to AFSPC. When the U.S. Space Command and the U.S. Strategic Commands merged to form the new U.S. Strategic Command (STRATCOM) in Omaha, Nebraska, ARSPACE was reorganized and renamed ARSTRAT. With this organizational construct, SMDC is a dual-hatted command – as an Army Major Command (MACOM) and the Army Service Component Command to STRATCOM.

As a MACOM, SMDC has a 3-star headquarters in Arlington, Virginia. The two major subcomponents of SMDC are Deputy Commanding General for Operations (DCG-OPS) in Colorado Springs, Colorado and the Deputy to the Commander for Research Development and Acquisition (RDA) in Huntsville, Alabama. Within this organizational construct "USARSPACE (now ARSTRAT) remains the operational component to USSPACECOM (now STRATCOM), and USASSDC (now SMDC) remains the Army leader in missile defense technology, continuing its research and development to support both strategic and tactical missile defense systems."[23]

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22 *Seize the High Ground*, B33-B36.

23 Department of the Army, *Field Manual 100-18: Space Support to Army Operations*. (Washington, D.C.: U.S. Government Printing Office, 1995), v.

Figure 1. USASMDC Organization Chart[24]

The Mission Statement for SMDC/ARSTRAT is as follows:

> As an Army major command (MACOM) and the Army Service Component to USSTRATCOM, SMDC/ARSTRAT conducts space operations and provides planning, integration, control and coordination of Army forces and capabilities in support of USSTRATCOM missions; serves as proponent for space and ground-based midcourse defense and as Army operational integrator for global missile defense; conducts mission related research, development, and acquisition in support of Army Title 10 responsibilities and serves as the focal point for desired characteristics and capabilities in support of USSTRATCOM missions.[25]

This paper will address in-depth only the active duty operational units under the Deputy Commanding General Operations (DCG-OPS) and manned by FA40 Space officers. These are primarily those elements in the 1st Space Brigade and 1st Space

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24 U.S. Army Space and Missile Defense Command, "Organization and Staff," par. 2 [government website] (cited 6 July 2005) available on World Wide Web @ http://www.smdc.army.mil/SMDC/org_poc.html

25 U.S. Army Space and Missile Defense Command, "Organization and Staff," par 1.

Battalion. Although the Future Warfare Center (FWC) has active duty FA40s manning the officer billets, any discussion pertaining to the FWC will be in the context of their manning requirements and combat development efforts in the Space mission area.

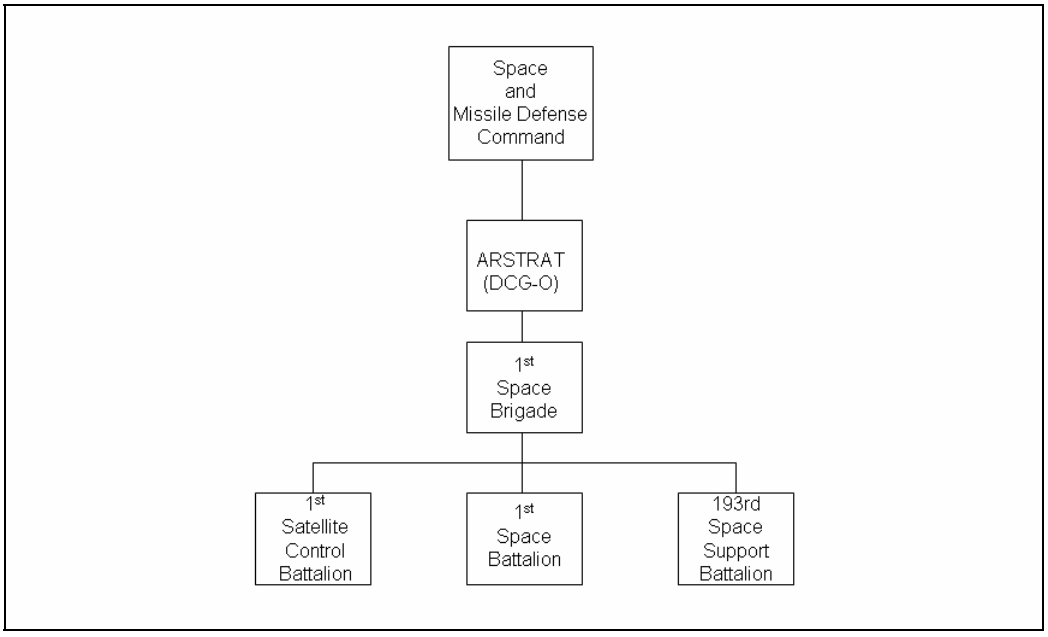

Figure 2 SMDC/ARSTRAT Organization Chart[26]

The 1st Space Brigade, located in Colorado Springs at Peterson Air Force Base, is commanded by an FA40 Colonel. The 1st Space Brigade Mission Statement is to:

> Conduct continuous, global space support, space control and space force enhancement operations in support of USSTRATCOM and Supported Combatant Commanders enabling the delivery of decisive combat power.[27]

The 1st Space Brigade executes its mission through its three subordinate battalions. 1st Brigade is the only command opportunity for Space officers in the rank of Colonel. The Space Brigade has three subordinate battalions as shown in the Figure 2 wire diagram.

The 1st Satellite Control Battalion, also located in Colorado Springs at Peterson Air Force Base, is the "Army's longest serving space battalion" and is responsible for

26 U. S. Army Strategic Command, *ARSTRAT Command Brief*, (Colorado Springs: 2005), 3.

27 U. S. Army Strategic Command, *ARSTRAT Command Brief*, (Colorado Springs: 2005), 3.

operating the Defense Satellite Communications System (DSCS) ground stations.[28] The 1st Satellite Control Battalion is a pure signal unit and is only manned by signal officers and soldiers.

The 193rd Space Support Battalion is a Colorado Army National Guard unit and is also located at Peterson Air Force Base. This paper will not address either the 193rd or the 1st Satellite Control Battalion in further detail. For the purposes of this paper, I will only assess active duty units within the Army space community. The detailed manning and equipping of the 1st Space Battalion will be addressed in Chapters V and VI.

The 1st Space Battalion is composed of four companies and a stand-alone team. These subordinate elements are the Headquarters and Headquarters Company (HHC), the 1st Space Company, 2nd Space Company, 3rd Space Company, and the Commercial Exploitation Team (CET).

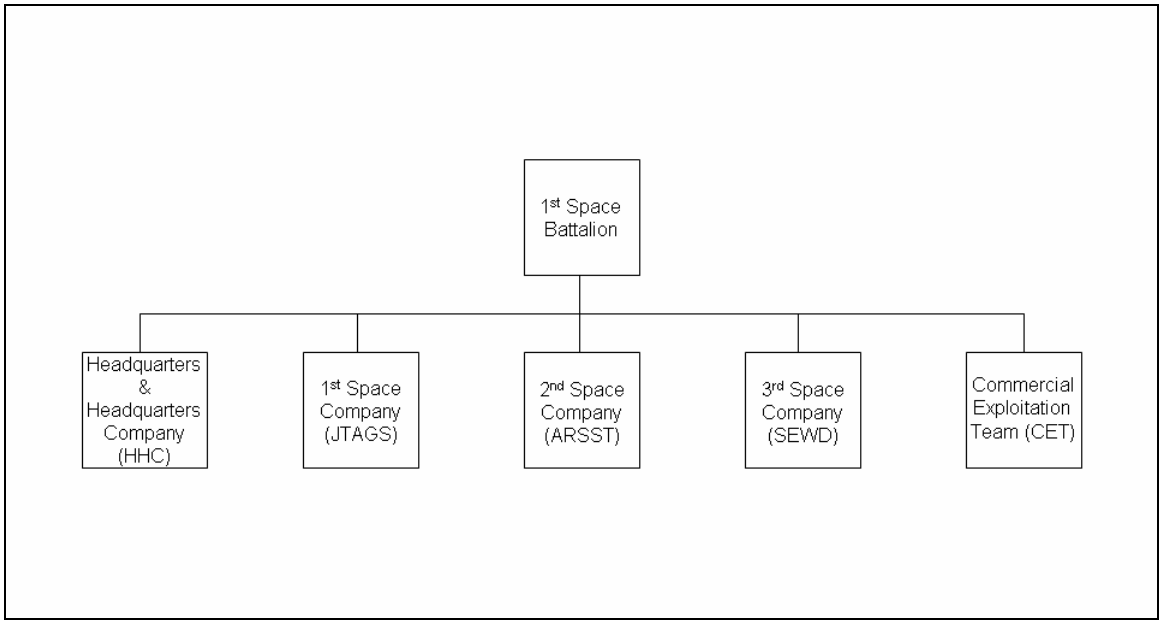

Figure 3. 1st Space Battalion Organization Chart[29]

28 Walker, James, Dr. and James T. Hooper. *Space Warriors: The Army Space Support Team.* (Washington, D.C.: US Government Printing Office, 1999", 156.

29 U. S. Army Strategic Command, *ARSTRAT Command Brief*, (Colorado Springs: 2005), 5.

The 1st Space battalion is commanded by an FA40 Lieutenant Colonel (LTC) and is the Army's only command opportunity for FA40s in the rank of LTC. The 1st Space Battalion Mission Statement is:

> Plan, coordinate, integrate and synchronize execution of Space Force Enhancement Functions; provide continuous assured Theater Ballistic Missile Warning, Combined Early Warning and Battlespace Characterization; conduct Space Control and Information Operations; and provide commercial satellite imagery data in support of Army, Joint and Combined Forces.[30]

The Headquarters and Headquarters Company (HHC) is commanded by an FA40 Major and includes the Battalion Commander, Executive Officer and the Command Sergeant Major. The Battalion's Personnel and Administration Section (S1), Intelligence Section (S2), Operations Section (S3), Logistics Section (S4) and Communications Section (S6) are elements within the HHC. The HHC mission statement is:

> Deploys and sustains 1st Space Battalion assets; executes command and control (C2) of space assets in order to coordinate, integrate and synchronize efforts of battalion assets across the battlefield; provides commercial imagery and air suite mission C2 to combatant commanders.[31]

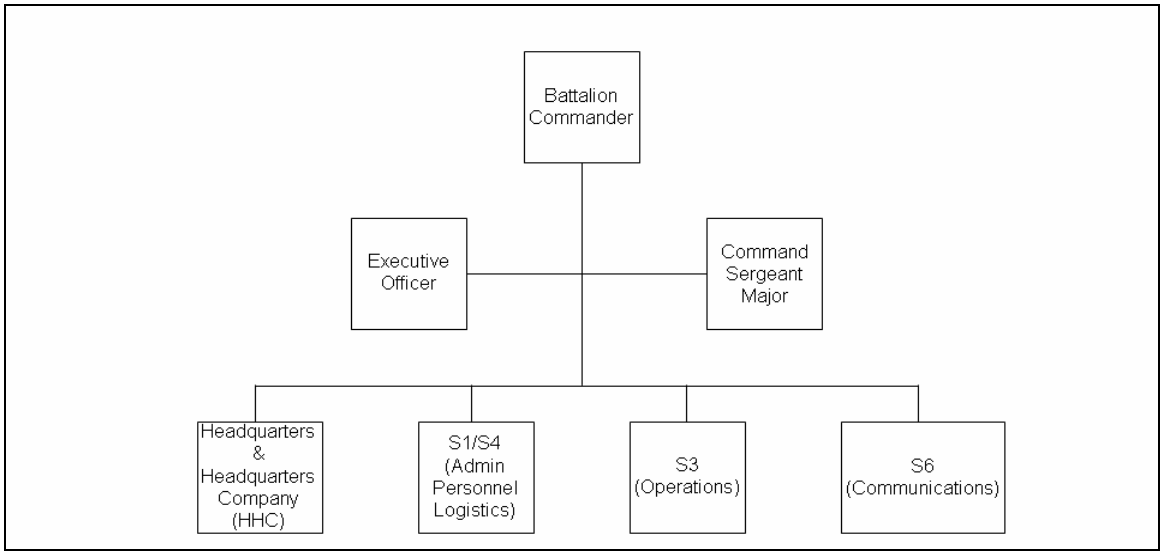

Figure 4. Headquarters Organizational Chart[32]

30 U. S. Army Strategic Command, *ARSTRAT Command Brief*, (Colorado Springs: 2005), 5.

31 Ibid., 6.

32 U. S. Army Strategic Command, *ARSTRAT Command Brief*, (Colorado Springs: 2005), 6.

The 1st Space Company or the Joint Tactical Ground Stations (JTAGS) Company is under the command of an FA40 Major and is consists of three detachments. Each detachment has two JTAGS sections for a total of six systems. The JTAGS are deployed worldwide to support Joint Theater operations. The JTAGS crew members are primarily Air Defense Artillery soldiers. The 193rd Space Support Battalion (Colorado National Guard) does not have a JTAGS company; it is DoD-unique to the 1st Space Battalion. The 1st Space Company mission is as follows:

> Provide continuous assured Theater Ballistic Missile Warning, Combined Early Warning and Battlespace Characterization to EUCOM, PACOM, CENTCOM and STRATCOM Combatant Commanders. On order, deploy a section globally in support of contingency operations.[33]

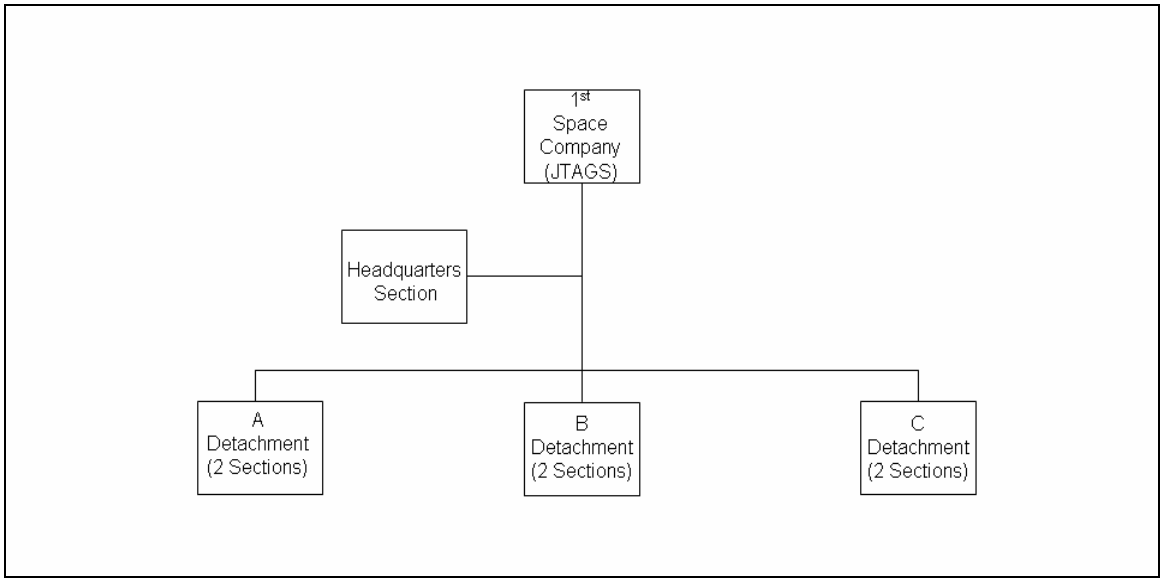

Figure 5. 1st Space Company Organization Chart[34]

The 2nd Space Company or the ARSST Company, commanded by an FA40 Major, consists of eight Army Space Support Teams. Of the eight ARSST teams, four are manned by Reserve Component (RC) soldiers. The ARSST construct was initially designed to habitually support Corps and echelons-above-corps (EAC). However, the operational tempo (OPTEMPO) proved to be too high and habitual association of the ARSSTs with their supported Corps ended. The 2nd Company ARSSTs are deployed

33 U. S. Army Strategic Command, *ARSTRAT Command Brief*, (Colorado Springs: 2005), 7.

34 Ibid.

worldwide to provide in-Theater support at the operational and strategic level and to augment SSEs at the tactical (UEx) and operational (UEy) levels. The 2nd Space Company mission is:

> Deploy globally to plan, coordinate, integrate and synchronize execution of the Space Force Enhancement Functions, Space Control and space situational awareness, in support of military and civil operations.[35]

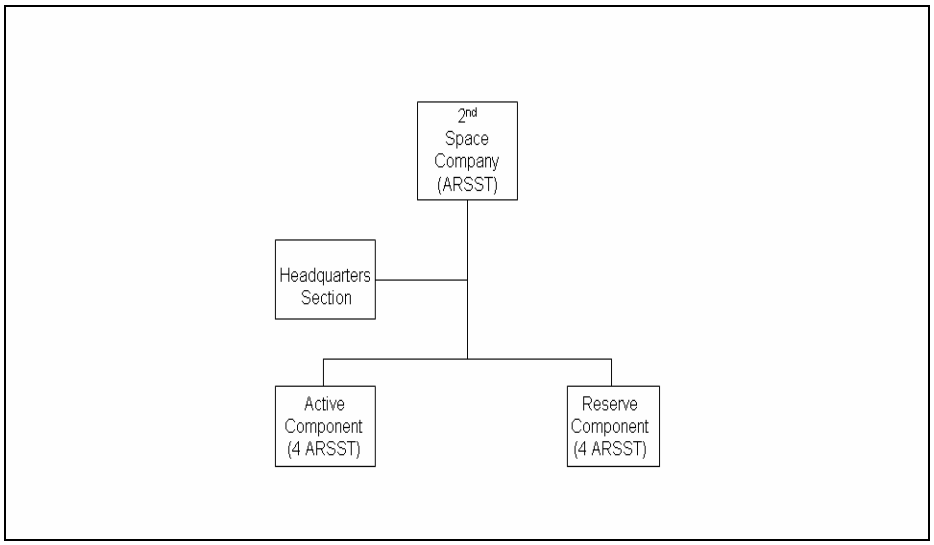

Figure 6. 2nd Space Company Organization Chart[36]

The 3rd Space Company (Provisional), commanded by an FA40 Major, has two detachments. The Space Electronic Warfare Detachment (SEWD) ground suite is located at Colorado Springs and the SEWD air suite is at Kirtland Air Force Base. The term "Provisional" indicates the company force structure is not currently recognized by the Army's Modified Table of Organization and Equipment (MTOE) documentation. Because of its provisional status, it is manned by soldiers from the 2nd Space Company. Future MTOE documents will include this force structure. The mission of the 3rd Space Company is:

> Deploy globally and conduct Space Control and Information Operations by providing ground mobile surveillance and assessment of space systems;

35 U. S. Army Strategic Command, *ARSTRAT Command Brief*, (Colorado Springs: 2005), 8.

36 Ibid.

and specialized airborne test and evaluation of command, control and information systems.[37]

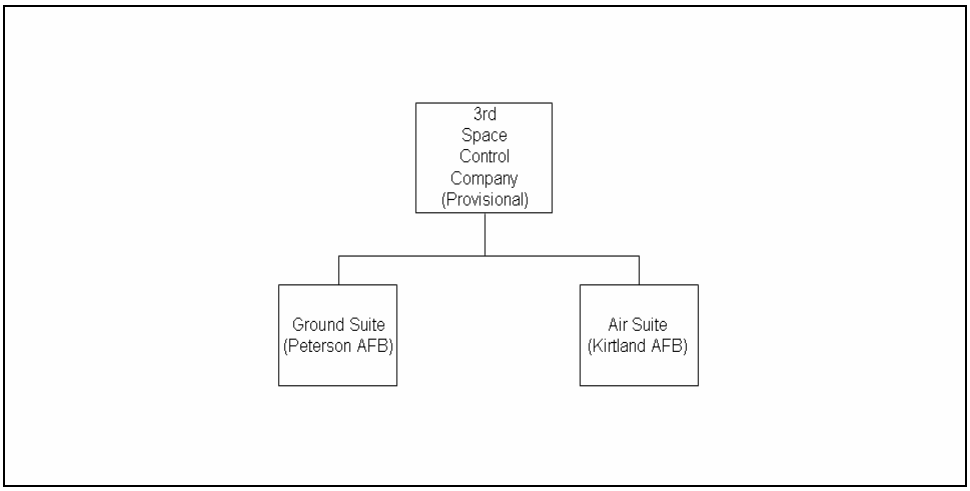

Figure 7. 3rd Space Company Organization Chart[38]

The Commercial Exploitation Team (CET), commanded by an FA40 Major, is another DoD-unique system in the 1st Space Battalion. The CET is manned by active and reserve soldiers and equipped with the Eagle Vision II direct downlink system. The CET mission is:

> Acquire direct down-linked and bent pipe commercial satellite; provide initial product exploitation and disseminate directly to the warfighter.[39]

37 U. S. Army Strategic Command, *ARSTRAT Command Brief*, (Colorado Springs: 2005), 9.

38 U. S. Army Strategic Command, *ARSTRAT Command Brief*, (Colorado Springs: 2005), 9.

39 Ibid., 10.

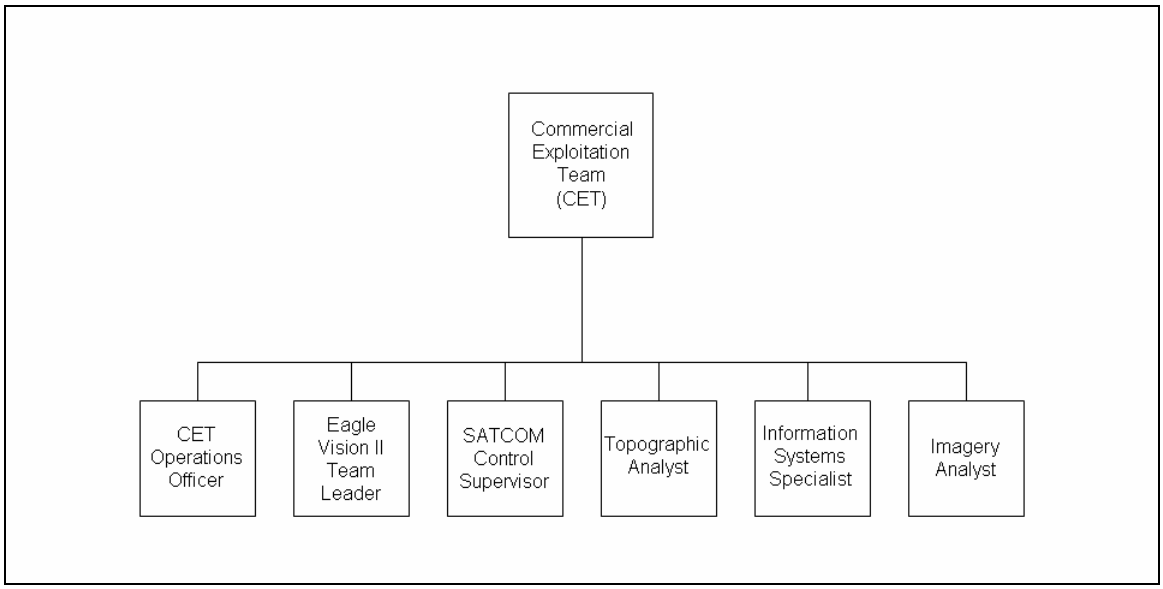

Figure 8. CET Organization Chart[40]

From the Battalion and Brigade mission statements and their respective unit organizations, 1st Space Brigade and 1st Space Battalion identified and developed critical tasks which ensure and enable mission success. These critical tasks are called Mission Essential Task Lists (METL). METL tasks are not developed for Army units below battalion level. The 1st Space Brigade METL follows:

Provide Space Support
Provide Space Control
Provide Space Force Enhancement
Conduct Theater-Wide Information Operations (IO)
Protect Ground Based Space Assets
Deploy (Proposed)[41]

The 1st Space Battalion METL follows:

Deploy and redeploy Battalion Space Forces
Command and Control Battalion Space Forces
Provide continuous assured Theater Ballistic Missile Warning, Combined Early Warning, and Battlespace Characterization
Plan, coordinate, integrate and synchronize execution of Space Force Enhancement Functions

40 U. S. Army Strategic Command, *ARSTRAT Command Brief*, (Colorado Springs: 2005), 10.

41 U. S. Army Strategic Command, *ARSTRAT MSE METL Brief*, (Colorado Springs: 2005), 4.

Sustain deployed Battalion Space Forces
Conduct Space Control and Information Operations
Protect the Force[42]

It is important to note that both the Battalion and Brigade METL contain Information Operations. At brigade level, there is a break in METL traceability with respect to Information Operations. The Brigade METL lists theater-wide IO support but IO is not yet part of their mission statement. The SMDC/ARSTART mission does include Information Operations but neither Joint nor Army Space doctrinal publications identify IO as a space mission area. The Battalion Mission and METL are consistent in their inclusion of IO but this Battalion METL task cannot be traced to parent organization mission statements or doctrinal references.

The mission area of IO is being directed to SMDC by STRATCOM and is a new development within the past 18 months. STRATCOM tasked SMDC/ARSTRAT to be the Army Service Component Command (ASCC) for the mission areas of space, IO, global strike, integrated missile defense, and command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR). The STRATCOM organizational alignment of Joint Force Component Commands, addressed in subsequent paragraphs, resulted in SMDC assuming ASCC responsibilities in these numerous mission areas. The inclusion of IO in the Space Brigade and Battalion METL can be traced to these recent changes to the STRATCOM roles, responsibilities and mission areas. Subsequent revision of the Brigade mission statement will contain the IO mission area.

The STRATCOM mission changes came from decisions made at the highest levels of DoD and the government. President Bush made significant changes to the Unified Command Plan (UCP) in 2002. The biggest change was the merger of the United States Space Command (SPACECOM) with the United States Strategic Command (STRATCOM). STRATCOM was activated on 1 October 2002. This merger

42 U. S. Army Strategic Command, *ARSTRAT Command Brief*, (Colorado Springs: 2005), 6.

resulted in an expanded STRATCOM "which is now responsible for Space operations, information operations, computer network operations and strategic defense and attack missions."[43]

In January 2003, the President signed Change Two to the UCP. STRATCOM received four new areas of responsibility from Change Two to the UCP. The previously unassigned mission areas are Global Strike, Missile Defense Integration, Department of Defense Information Operations and C4ISR. "The merger improves combat effectiveness and speeds up information collection and assessment needed for strategic decision making. The merged command will be responsible for both early warning of and defense against missile attacks as well as long-range strategic attacks."[44]

STRATCOM divided responsibility for its four mission areas among Joint Force Component Commands (JFCC). They are JFCC-Integrated Missile Defense (IMD), JFCC-Intelligence, Surveillance and Reconnaissance (ISR), JFCC-Space & Global Strike (S&GS) and JFCC-Network Warfare (NW). STRATCOM designated SMDC/ARSTRAT the JFCC-IMD. The Air Force provides the JFCC-S&GS. The United States Strategic Command mission statement is:

> Provide the nation with global deterrence capabilities and synchronized DoD effects to combat adversary weapons of mass destruction worldwide. Enable decisive global kinetic and non-kinetic combat effects through the application and advocacy of integrated intelligence, surveillance and reconnaissance (ISR); space and global strike operations; information operations; integrated missile defense and robust command and control.[45]

The assigned mission areas in STRATCOM that fall under the JFCC-S&GS are Nuclear Deterence, Space Operations, Global Strike and IO. IO is a shared mission area with the JFCC-NW.

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43 Howard, Michael L.: Editor in Chief. "How the Army's Strategic Role in Space is Changing," *The Army Space Journal*, Winter/Spring 2004, 12.

44 U.S Strategic Command, "U.S. Strategic Command History," par. 1 [government website](March 2004 [cited 24 May 2005]) available on World Wide Web @ http://www.stratcom.mil/about-ch.html

45 U.S Strategic Command, "U.S. Strategic Command," par. 1 [government website], [cited 24 May 2005] available on World Wide Web @ http://www.stratcom.mil/index.html

As the Army Service Component Command (ASCC) for JFCC-SGS, SMDC/ARSTRAT's mission and force structure will similarly expand and adjust to meet the new roles responsibilities. The IO mission area is the biggest change to the previous mission focus of the earlier SMDC/ARSPACE organization and is the most problematic because of manning and expertise concerns. The scope of the newly assigned duties as the Army's lead planner, integrator, and coordinator for IO in STRATCOM will take a great deal of time to progress, mature and man.

This is problematic in the defined roles and responsibilities of Army Space Operations. The Functional Area 40 officer or Space Operations Officer emerged to provide space expertise to the warfighter and to enable designated FA40 officers a career path that facilitated mission expertise development and use. The Army similarly designated a functional area officer group, FA30 or Information Operations Officer, as the cadre group responsible for IO. Many aspects of the Space Brigade and Battalion Mission and METL, if not all, involve IO, but SMDC and the Army Space community is not the proponent for IO.

The expanding Space mission area provides more than adequate challenges and workloads for the low density FA40 Space cadre. The FA40 missions are already experiencing contested overlap areas with other Army communities, such as the Communications and Intelligence branches and IO will contribute more areas of conflict. Almost any activity on the battlefield can be considered Information Operations. The direct impact of space control, force enhancement and many other space activities will result in IO objectives. Establishing SMDC as the Army lead to STRATCOM for IO will require increases in force structure, equipment and manning of the Space Brigade and Battalion. Concepts of Operation (CONOPS) and doctrine will also have to be developed to mesh IO activities into space operations.

D. ARMY SPACE MISSION AREAS: DOCTRINE AND POLICY LINKAGES

Army Space doctrine is derived from Joint Publication 3-14 (JP 3-14), Joint Doctrine for Space Operations, and from National, Joint and Service policy. The latest revision of JP3-14 was signed and published in August 2002. Army space doctrine is described and defined in Field Manual 3-14 (FM 3-14), Space Support to Army

Operations. FM 3-14 identifies the same four mission areas of Space Operations as in JP 3-14. These Space Operations mission areas are Space Support, Force Application, Force Enhancement and Space Control. "These are all actions that contribute to using space to dominate the battlefield and ensure superiority. Army space operations consist of those activities concerned with controlling and exploiting space to enhance land warfighting."[46]

Space support is defined by Joint Pub 3-14 as activities that "launch, deploy, augment, maintain, sustain, replenish, deorbit, and recover space forces, including the C2 network configuration for space operations." The space support mission area is further defined by its two functions; spacelift, deorbiting and recovery, and satellite operations. Satellite operations are those actions taken to provide telemetry, tracking and commanding (TT&C) for satellites.[47]

Army doctrine clearly states that space support is primarily an Air Force and DoD Space Executive Agent mission. However, the Army is responsible for the Defense Satellite Communications System's (DSCS) payload and network control and has backup contingency control capability to the Air Force for DSCS bus operations.

The Force Application mission area is not considered a current activity by Army doctrine but a "potential mission of the future."[48] Joint doctrine defines this mission area in JP 3-14:

> The application of force would consist of attacks against terrestrial-based targets carried out by military weapon systems operating in or through space. The force application mission area includes ballistic missile defense and force projection.[49]

The Army doctrine acknowledges ballistic missile defense (BMD) weapon systems as force application platforms, but does not elaborate on BMD doctrine within

46 Department of the Army, *Field Manual 3-14: Space Support to Army Operations*. (Washington, D.C.: U.S. Government Printing Office, 2004), 1-9.

47 Department of Defense Joint Staff, *Joint Publication 3-14: Joint Doctrine for Space Operations*. (Washington, D.C.: 2002), IV-10.

48 *Field Manual 3-14: Space Support to Army Operations*. 2-13.

49 *Joint Publication 3-14: Joint Doctrine for Space Operations*. IV-10.

FM 3-14. BMD systems and ICBMs are the only current DoD force application systems. This is a mission area that needs more accurate definition in Joint and Service doctrine. Ballistic trajectories that pass through the space medium should not be considered Force Application if the missile or projectile's target is terrestrial and no space maneuvers occur.

The Force Enhancement mission area consists of "those operations that multiply joint force effectiveness by enhancing battlespace awareness and providing needed warfare support." These Force Enhancement activities improve the lethality of all Service forces and are conducted by the DoD, other government agencies and commercial companies. Joint Doctrine identifies five Force Enhancement functions:

Intelligence, Surveillance and Reconnaissance (ISR); integrated tactical warning and attack assessment; environmental monitoring; communications; and position, velocity, time and navigation (PVNT). [50]

The Army has long claimed that as a Service, it is the largest user of space. This statement is based upon the huge number of GPS receivers and SATCOM terminals in the Army. Because of the Army's large and ever increasing reliance on space-based products and services, the Service focuses its Space Operations activities on Force Enhancement functions. Those Force Enhancement functions detailed in JP 3-14 are consistently represented in FM 3-14. Within the Army, there is much contention between the communications and space communities as to who has responsibility. The Army Signal Corps see SATCOM as just another piece in an Army and Joint communications architecture. The Army space community believes that SATCOM is a large part of why the FA40 career field was developed and thus their mission area.

In support of the Communications function of Force Enhancement, SMDC/ARSTRAT has operational control (OPCON) of the three Regional Satellite Support Centers (RSSC), and contributes personnel to operate the USSTRATCOM-operated Global Satellite Support Center (GSCC). The RSCC facilities plan and manage global communications for the warfighting commands. Regional Combatant Commands

50 *Joint Publication 3-14: Joint Doctrine for Space Operations*. IV-8.

coordinate UHF, SHF, EHF and commercial satellite communications support through their respective RSSC sites. The GSCC performs the same support activities for Unified Commands and other agencies that do not have an assigned RSCC.

RSSC Support Structure	
RSSC	**Supports**
RSSC-CONUS	JFCOM SOCOM CENTCOM SOUTHCOM
RSSC-Europe	EUCOM
RSSC-Pacific	PACOM
GSSC	USSTRATCOM Defense agencies TRANSCOM Other users NORTHCOM

Table 1. Satellite Support Center Matrix[51]

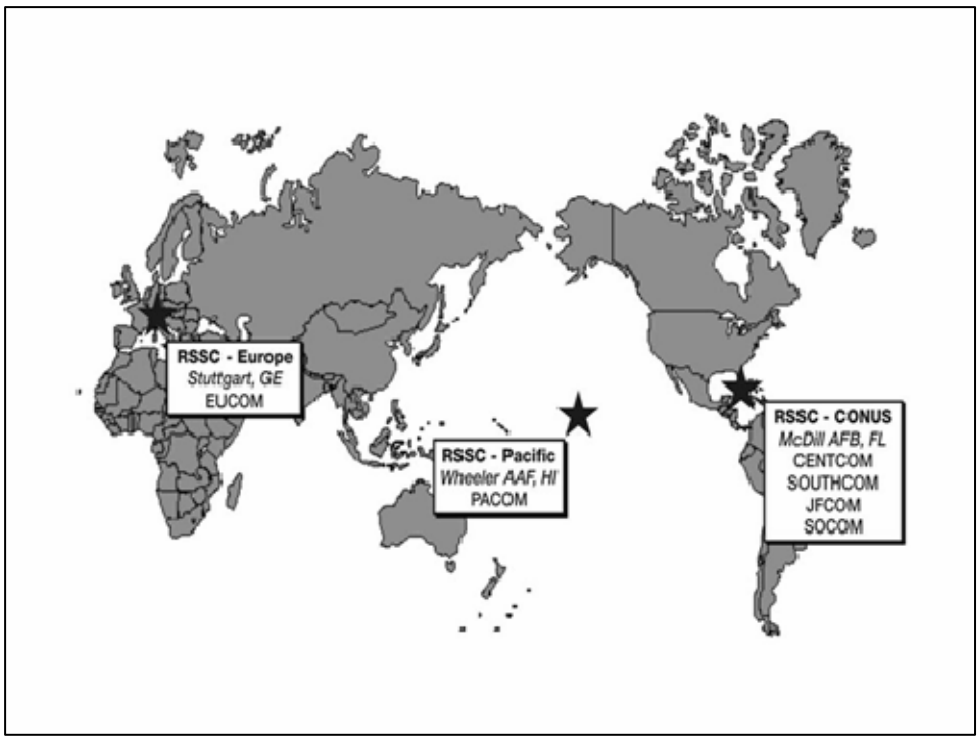

Figure 9. RSCC Site Map[52]

SMDC/ARSTRAT also has the responsibility of SATCOM system expert for the Wideband Gapfiller System SHF satellites. These Wideband Gapfiller satellites will augment the DSCS constellation when the constellation is in orbit.

51 *Field Manual 3-14: Space Support to Army Operations*. B-4.

52 *Field Manual 3-14: Space Support to Army Operations*. B-5.

The Global Positioning System (GPS) constellation provides the Services with precise location and timing data. The GPS location data enables use of precision guided munitions, high speed maneuver by air and ground assets and Blue Force Tracking of friendly assets to maximize C2 and battlespace awareness. The GPS constellation provides the data but the Army space professional has the mission of incorporating, leveraging, and maximizing the effects of PVNT data in warfighting operations.

Environmental monitoring is the use of space-based sensors to produce valuable meteorological and space environmental data. This Force Enhancement function supports warfighters by improving Intelligence Preparation of the Battlefield (IPB) and allowing commanders on the ground to avoid areas that present an environmental disadvantage to operations. All Services have an interest in the Environmental Monitoring function of the Force Enhancement mission area.

The ISR function of Force Enhancement mission area is defined as "the monitoring of terrestrial Areas of Interest from space to help reveal location, disposition, and intention of tactical, operational, and strategic levels of war."[53] ISR also has a battle damage assessment (BDA) component which is critical to battlefield situational awareness. As with SATCOM, the Army has two different segments of the Service that believes space-based ISR is their responsibility. The Army's intelligence and space communities both see this function as their responsibility within the Service. In fact, FM 3-14 states that "space-based ISR is one component of the seamless ISR enterprise."[54] Both communities have doctrinal claims to and pursue activities in the ISR function of Force Enhancement.

The Early Warning function of Force Enhancement is the detection and dissemination of information regarding an enemy's use of ballistic missiles at the strategic, operational and tactical levels of war. All Services have a role in this function. Within the Army, the space and missile defense communities share the lead role in Early

53 *Joint Publication 3-14: Joint Doctrine for Space Operations.* IV-8.

54 *Field Manual 3-14: Space Support to Army Operations.* 2-7.

Warning within the Space and Missile Defense Command. The dual nature of the MACOM precludes the open disagreement of who should have the Army's lead for Early Warning.

The Space Control mission area is defined in Joint doctrine as those actions providing unrestricted use and access of space and space-based assets by friendly forces and denying an adversary access to the same. JP 3-14 breaks down the Space Control mission area into four functions. These Space Control functions or missions are

Protection, Prevention, Surveillance and Negation. The ultimate goal of the Space Control mission is to "gain and maintain space superiority and situational awareness of events that impact space operations."[55]

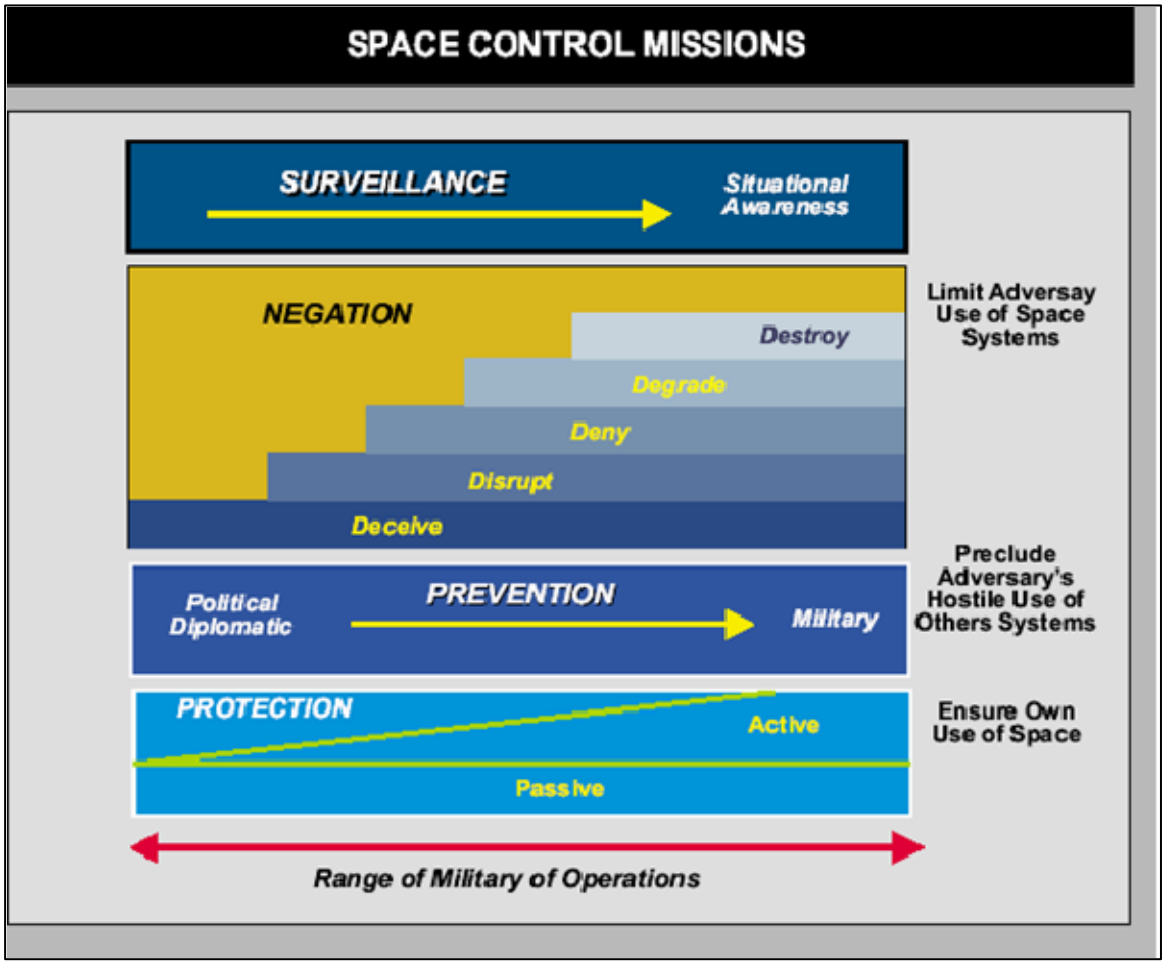

Figure 10. Space Control Missions[56]

55 *Joint Publication 3-14: Joint Doctrine for Space Operations.* IV-6.

56 *Joint Publication 3-14: Joint Doctrine for Space Operations.* IV-6.

The Army, sensitive to the possibility of being forced out of the Space Control mission area by the Air Force, quotes JP 3-14 in Field Manual 3-14; "The Army is to provide space control operations and space support to the Joint force…" The newly developed Army Space Policy signed in 2003 is also cited and is the first Service document that formally states the Army's intention to actively pursue ground-based space control capabilities.

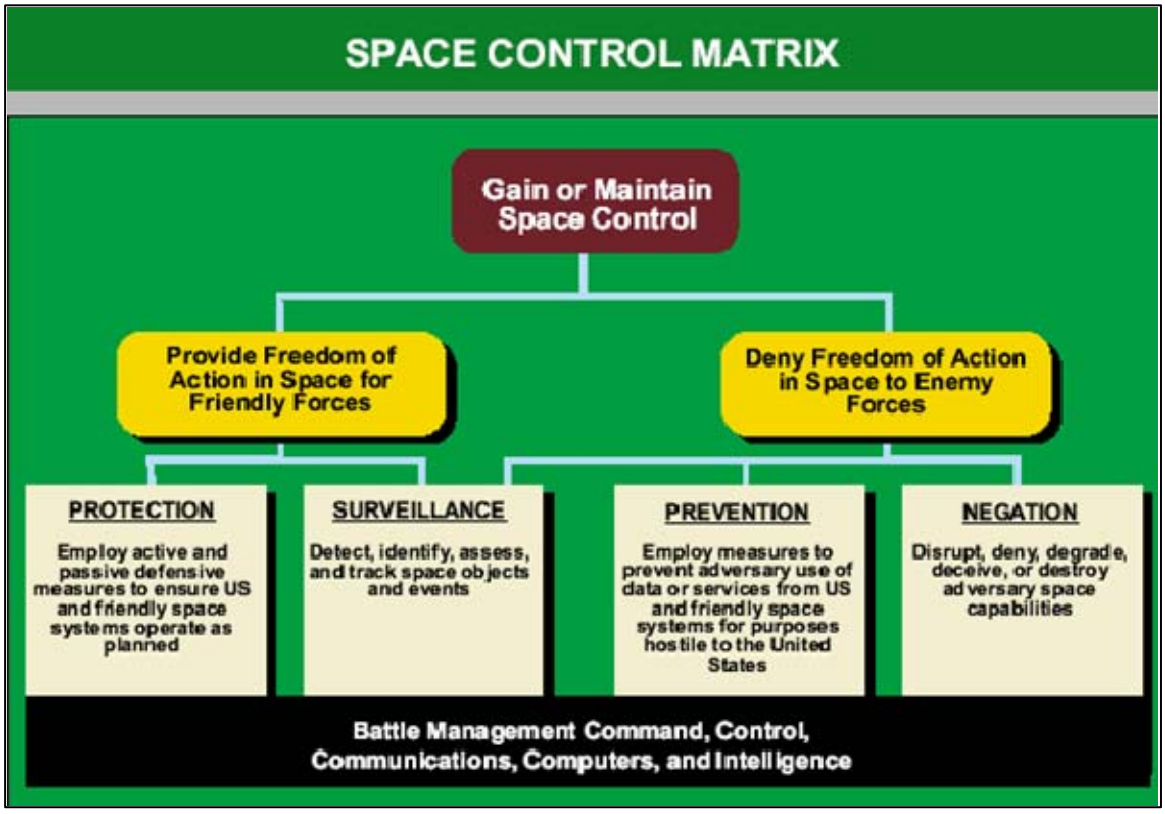

Figure 11. Space Control Matrix[57]

The Army's FM 3-14 differs slightly from the Joint space doctrine. The Army doctrine identifies "five interrelated objectives". The Army Space Control objectives identified in FM 3-14 are:

> Surveillance of space to be aware of the presence of space assets and to understand real-time satellite mission operations.
> Protect U.S. and friendly space systems from hostile actions.
> Prevent unauthorized access to, and exploitation of, space systems.
> Negate hostile space systems that place our interests at risk.
> Directly support battle management, command, control, communications, and intelligence.[58]

57 *Joint Publication 3-14: Joint Doctrine for Space Operations*. IV-6.

This is a subtle difference between the Army and Joint doctrinal publications. Army doctrine directly links Space Control activities to overall battle management, C2 and communications. The reason for that difference appears in subsequent paragraphs of FM 3-14:

> Therefore any accomplishment of space control whether it is protecting our own space assets, preventing unauthorized use of our assets, negating those of the adversary, or even simply surveiling assets to note their location and function, affects information. Operations to change the state of information, whether it is gaining more for our use or denying it to the adversary, can be related to information operations.[59]

The Army Space community has thus established a doctrinal basis to formally take an expanding Information Operations role within the Service, and it has formalized the Service commitment to Space Control in doctrine and policy.

Joint Publication 3-14, Doctrine for Joint Space Operations establishes four Space Mission areas. Those mission areas are Force Enhancement, Force Application, Space Support and Space Control. From those core mission areas the Army developed space capabilities or functions: communications; intelligence, reconnaissance and surveillance (ISR); missile defense; weather, terrain and environmental monitoring (WTEM); position, velocity navigation and timing (PVNT). These capabilities can be traced not only to Joint Publication 3-14, Doctrine for Joint Space Operations, but also to early Army space doctrinal publication and policies such as TRADOC Pamphlet (TP) 525-60, Operations Concept, Space Support to Land Forces Operations and the 1993 Army Space Policy. The Secretary of the Army approved the first iteration of Army Space doctrine, Field Manual (FM) 100-18, Space Support to Army Operations, in 1993.

In 2003, TP 525-60 was replaced by TP 525-3-14, Concept for Space Operations in Support of the Objective Force. Building upon JP 3-14 and FM 100-18, TP 525-3-14 built upon the four mission areas of Space Support, Force Enhancement, Force Application and Space Control. The Army identified specific space functions within the four space mission areas.

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58 *Field Manual 3-14: Space Support to Army Operations.* 2-12.

59 *Field Manual 3-14: Space Support to Army Operations.* 2-12.

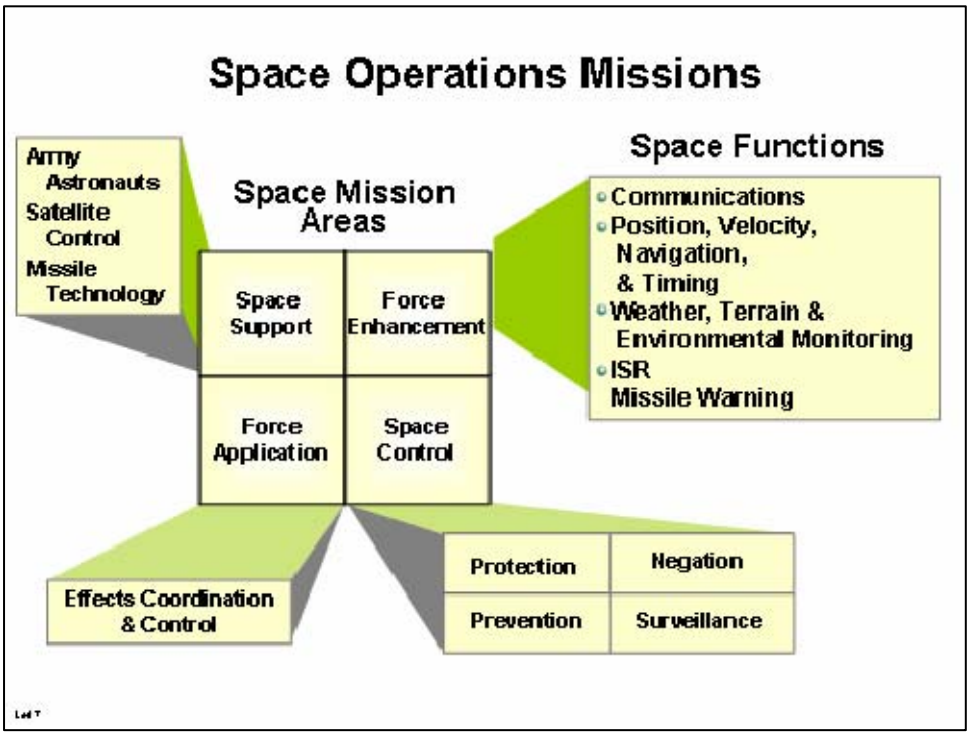

Figure 12. Space Operations Mission Areas[60]

In April 2003, the Secretary of the Army signed the new Army Space Policy. The new Space Policy formally tied space to Army Transformation. "Space is inherently Joint and full operational integration of Space with Land, Air, Sea, and Information capabilities is necessary to achieve the Army's Transformational Objectives, an integral part of Department of Defense (DoD) Transformation, and the Army Vision."[61]

The new Army Space Policy restated the FM 100-18 space capabilities, but also added a new element (listed in bold):

> Responsive, dynamic, space based-intelligence, surveillance, and reconnaissance sensors networked with land, sea, air, and soldier sensors…
>
> Seamlessly integrated, dynamic bandwidth, satellite communications (SATCOM) on-the-move…

60 U. S. Army Space and Missile Defense Command, *Concept for Space Operations in Support of the Objective Force Brief to the AROC*, (Washington, D.C.: 2003), 53.

61 Army Space Policy, par 3.

> Assured, accurate, real-time missile warning and tracking distributed direct to affected forces and battle command systems…
> Precise, redundant, jam resistant; position, velocity, navigation, and timing services…
> Advanced sensors for timely, tailorable weather, terrain, and environmental monitoring…
> **Responsive, tactically relevant Space Control capabilities synchronized and integrated with Land, Sea, Air, and Information Operations...**[62]

The original Army-advocated space capabilities; ISR, communications, WETM, PVNT and missile warning; were expanded to include space control. At no other time has the Army openly acknowledged in policy that the Service would pursue space control capabilities.

> The Army's functions are expanded to include the following: Operate select spacecraft and spacecraft systems; Organize, train, equip, and provide forces for Army and Joint Space Operations; Develop Army doctrine, tactics, techniques, procedures, and equipment employed by Army and Joint forces in conduct of Space Operations; Interdict enemy space power through operations on or from land; Participate with other Service in Joint Space Support Operations when directed.[63]

TRADOC Pamphlet 525-3-14 went before an Army Requirements Oversight Council (AROC) in January 2003. The purpose of the AROC briefing was to gain Chief of Staff, Army (CSA) approval of the draft TP525-3-14 and the identified Army Space Operations Essential Tasks. The proposed Space Operations Essential Tasks were:

> Support increased deployability and reduced theater footprint
> Enable situational understanding "Off the Ramp" during entry operations
> Support precision maneuver, fires, sustainment and information
> Enable continuous information and decision superiority
> Protect the force during all phases of the operation.[64]

The CSA approved the TP 525-3-14 document and the Space Operations Essential Tasks. The new Army Space Policy was signed into effect shortly thereafter in April 2003. In April 2005, the CSA signed FM3-14, Space Support to Army Operations.

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62 Army Space Policy, 1-2.

63 Ibid., 2.

64 *Concept for Space Operations in Support of the Objective Force Brief to the AROC*, 6.

From these existing doctrine and policy documents, ARSTRAT developed the mission statements for the 1st Space Brigade and the 1st Space Battalion that were covered in the earlier sections of this chapter.

III. THE ARMY AND TRANSFORMATION

A. OVERVIEW

The Army is currently undergoing a Transformation process. The final output of this Army Transformation process is an Objective Force. All Battlefield Operating Systems and combat enablers must be embedded in the Transformation process and the Objective Force. This chapter will present the driving factors behind Army Transformation and the Objective Force. If Space is not part of the Objective Force, it will not be a relevant Army mission area and the value of the existing space forces and the space operations officers will be questionable.

It is paramount to understand how Transformation is affecting the basic Army organizations if one is to know how space expertise can be leveraged to help these organizations. New terms such as Units of employment and Units of Action have emerged and the concept of modularity is being applied to warfighting organizations.

The end state of the Army's Transformation, the Objective Force, will be based upon Units of Employment and Units of Action. Units of Employment will have two levels, "x", the lower level, and "y", the higher level. The Army Divisions are being reorganized as Units of Employment (UEx) and brigades are being reorganized as Units of Action (UA). Corps and higher units are Units of Employment at the "y" level (UEy).

The focus of Army Transformation is to create a smaller, more responsive command structure that will tailor its combat forces to meet the existing threat and environment in the area of operation. Developing modular building blocks of combat power allows a command element to build the force structure needed for the mission requirements and to leave out building blocks not needed. This is in contrast to the Legacy Divisions of the 1990s that had large standing force structures and created a non-responsive, cumbersome combat unit. These Legacy Divisions required large amounts of time to deploy, reassemble in the area of operation, and conduct combat operations. Transformation will streamline the deployment process and put a tailored force package on the ground in a much shorter period of time. Army Transformation is all about increasing responsiveness, lethality and agility.

If Army space operators are to play a key role in the Transformed Army and the Objective Force, they must be embedded in the force structure development process. Placing space elements in the Objective Force organizations must occur if the Space mission area is to become a normalized component of Army operations. Chapters III and IV will address the decisions that the Army Space community must make in positioning space operators in the Objective Force construct. The impact of Joint Transformation and Joint Vision documents will flow into the Army's Transformation process. Chapter III will also identify the space capabilities that are being provided to the Objective Force, who will provide them, and at what unit level they will occur.

B. UNITS OF ACTION AND UNITS OF EMPLOYMENT

The Army is in the midst of a dynamic transformation process that will enhance Service support to Joint combat operations and Army-unique warfighting needs. "The United States Army has adopted a revolutionary transformation strategy to field a future Objective Force that is strategically responsive and dominant across the full spectrum of military operations."[65] Army Transformation will make the Service lighter, faster, more lethal and more relevant in responding to Joint, Interagency and Multinational (JIM) operations. The goal of this transformational change in the Army is the Objective Force.

> The main effort of transformation is the Objective Force. The Objective Force is our future full spectrum force: organized, manned, equipped, and trained to be more strategically responsive, deployable, agile, versatile, lethal, survivable, and sustainable across the entire spectrum of military operations from major theater wars through counter terrorism to homeland security. Army Objective Force units will dominate land operations, providing the decisive complement to air, sea, and space operations.[66]

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65 U.S. Army War College, *Army Transformation Wargame 2001: Vigilant Warriors*. (Carlisle Barracks, PA: April 2001), 1.

66 Annual Report to the President and the Congress, 122.

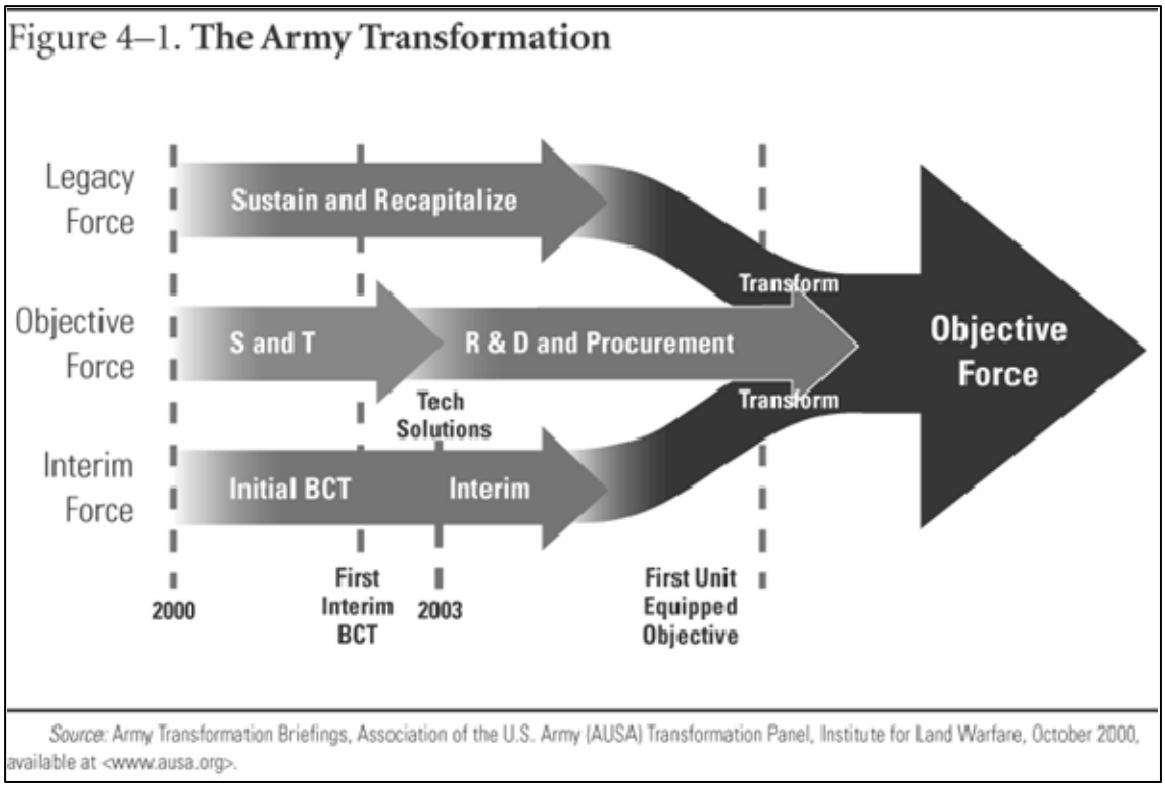

Figure 13. The Army Objective Force[67]

Army Transformation is directly linked to Joint Vision 2010 (JV 2010) operational concepts. The Joint concepts and capabilities that are under development by the Joint Staff, combatant commanders and Services are the "engines of change for the development of future military capabilities."[68] The original JV 2010 concepts or goals were Dominant Maneuver, Precision Engagement, Full Dimensional Protection and Focused Logistics. These four JV2010 concepts when fused with Information Superiority enable Full Spectrum Dominance.

These JV2010 concepts have evolved into a framework that is comprised of overarching Joint Operations Concepts (JOpsC), Joint Operating Concepts (JOC), Joint Functional Concepts and Joint Integrating Concepts (JIC). The overarching JOpsC are the descriptors of Joint Force operations in 20 years and the foundation of all Joint and

67 Association of the U.S. Army Transformation Panel, "Army Transformation Briefing," (Washington, D.C.: 2000), 4-1.

68 Department of the Army, *2004 Army Transformation Roadmap*. (Washington, D.C.: US Government Printing Office, 2004), 2-4.

Service Transformation. The JOCs are the basis for the future Joint Force commanders planning, preparation and execution of Joint operations. The JOCs are Homeland Security (HLS), Strategic Deterrence (SD), Major Combat Operations (MCO) and Stability Operations (SO).[69] The JOCs are not separate mission areas but rather interrelated, evolving concepts that focus all Services' Transformation efforts. From these JOCs the Army derives the required capabilities to support JIM operations. Space does not fall into the category of a JOpsC, JOC, or JFC. Space is an enabler for all of these categories.

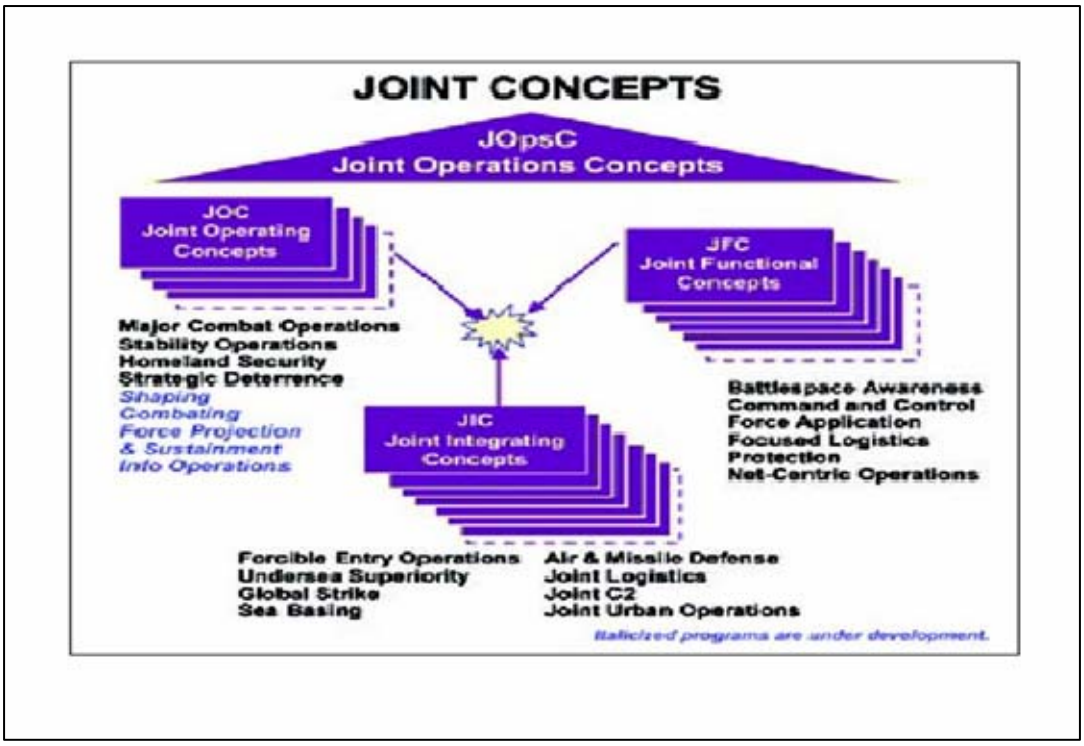

Figure 14. Joint Concepts from Joint Vision 2010[70]

Army Transformation and the Objective Force can be traced to Joint Vision 2010 and the evolving Joint Operating Concepts through Army Vision 2010. Army Vision 2010 sets the stage for Transformation by stating, "We must lighten up the heavy forces and heavy up the light forces." Army Vision 2010 takes the four JV2010 concepts listed

69 *2004 Army Transformation Roadmap*, 2-6 - 2-8.

70 Ibid., 2-3.

in the preceding page and identifies six patterns of operation. These patterns of operation are Project the Force, Sustain the Force, Decisive Operations, Shape the Battlespace, Protect the Force and Gain Information Dominance. As with the Joint Concepts, the Army identifies Space as a key enabler for these patterns of operation.

> Five of these patterns of operation align precisely with the Joint Vision 2010 operational concepts of Dominant Maneuver, Precision Engagement, Focused Logistics and Full Dimensional Protection. The sixth, Gaining Information Dominance, is fundamental to each of the other five Army patterns of operation as well as each of the operational concepts in Joint Vision 2010.[71]

Within the Army all development of doctrine, concepts and capabilities must be directly linked to Army Transformation and the Objective Force. If Space is to evolve as an acknowledged, key Army enabler, it must be embedded in the Objective Force framework. Until technology advancements in force enhancement systems improve and space awareness levels increase, this means embedding space personnel. The Army is transforming based upon the ever changing global environment and emerging threats. "America is a nation at war. Peace can no longer be viewed as the default condition. Nor war as the exception. The Army is transforming for continuous operations as a campaign-quality Army with joint and expeditionary capabilities."[72] This new strategic reality is defined by:

> A conflict of irreconcilable ideas
> A disparate pool of potential combatants
> Adaptive adversaries seeking our destruction by any means possible
> Evolving asymmetric threats that will relentlessly seek shelter in those environments and methods for which the nation is least prepared
> A foreseeable future of extended conflict in which the Army can expect to fight every day and in which real peace will be the anomaly[73]

Army Transformation will restructure the existing, Division-centric Army organization (Legacy Forces) and create adaptable, modular force packages that do not have huge command and control or support structures. The bridge between the Objective

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71 Department of the Army. *Army Vision 2010*. (Washington, D.C.: US Government Printing Office, 1998), 8.

72 Ibid., 2.

73 *2004 Army Transformation Roadmap*, 1-1.

Force and the Legacy Force will be a mix of new systems and capabilities as well as re-capitalized legacy systems, the Interim Force. The standard for the transformed Army is to be able to deploy a brigade sized unit anywhere in the world within "96 hours after 'wheels up' of the first aircraft, a division on the ground in 120 hours, and five divisions in theater in 30 days."[74]

The Transformed Army or Objective Force is based upon seven capabilities. The Objective Force capabilities are Responsiveness, Deployability, Agility, Versatility, Lethality, Survivability, and Sustainability. To accomplish this transformation, the Objective Force must have the current lethality and staying power of the Army's armor and mechanized divisions while maintaining the flexible deployability of light divisions:

> The Army will retain heavy force lethality through overmatch while giving it deployability and employability in areas currently accessible only by light forces. The Army Transformation seeks to produce a general-purpose Objective Force capable of meeting all these operational demands through an operational and organizational concept that reconciles the unchanging nature of war and the changing conduct of war.[75]

From these Army patterns of operation and objective Force capabilities, the Army has identified six Transformation priorities. The Transformation priorities are Increased Deployability, Reduced Footprint, Situational Understanding Off the Ramp, Information and Decision Superiority, Force Protection, and Precision Fires and Maneuver. Again, Space is an enabler for these priorities, not a priority unto itself.

The Army used a Gap Analysis methodology in the Transformation process to determine the capability shortcomings of the current forces and the evolving Objective Force. These gaps are directly linked to the Joint Operations Concepts from JV2010 and Army Vision 2010. The output from the analysis is not capabilities but rather capability gaps. As a critical enabler, Space operations can highlight its value to the Joint and the Army warfighters by linking the Gap Analysis findings with Space capabilities.

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74 Department of the Army. *Transformation Campaign Plan*. (Washington, D.C.: US Government Printing Office, 2002), 10.

75 *Transformation Wargame 2001: Vigilant Warriors*. 2-3.

Figure 15. Army Transformation Gap Analysis[76]

For Army Space operations to be relevant in the Objective Force, space capabilities must provide a solution that can bridge these Service gaps. Army Space doctrine, requirements, systems, capabilities and force structure must address these Army shortfalls if space is to transform with the Objective Force.[77] Space is valuable to the Objective Force for the capabilities the mission area provides, but aligning space capabilities with Army capability gaps highlights the mission area's enabling characteristics. The Army space community has identified space solutions to ten critical Army capability gaps. Table 2 shows the Army shortfalls and corresponding space capabilities that could bridge the gaps.

Army Capability Gap	**Space Capabilities**
Enhance Soldier Protection	Missile Warning, Space Control
Provide Effective Command and Control	SATCOM; Joint Blue Force Situational Awareness (JBFSA); Position, Velocity, Navigation and Timing (PVNT)
Enhance Platform Protection	Missile Warning, Space Control
Provide Dynamic, Uninterrupted C4 Architecture	SATCOM, JBFSA

76 *2004 Army Transformation Roadmap*, 2-13.

77 Coffin, Timothy. *Army in Space Brief Brief*. (Washington, D.C. 2005), 8.

Provide Modular, Tailorable Forces	Army Space Forces
Provide Capability for Lethal Overmatch	SATCOM, JBFSA, PVNT
Enable the Army to Train as it Fights	Modeling and Simulation, SATCOM, JBFSA, PVNT
Provide Superior Intelligence Surveillance and Reconnaissance (ISR) Capabilities	ISR, Weather Terrain Environmental Monitoring (WTEM)
Provide Capabilities to Detect and Identify Obstacles	ISR, WTEM
Provide Logistics to Sustain Modular Force	SATCOM, PVNT

Table 2. Army Capability Gaps and Space Enablers/Solutions[78]

These identified Space enablers to Army capability gaps set the foundation on which to establish Army Space priorities. The Space priorities resulting from this process are:

1. Seamless integrated, dynamic bandwidth for Battle Command on the move
2. Responsive, tactically relevant Space Control capabilities synchronized and integrated with Land, Sea, Air and Information Operations
3. Assured, accurate real time missile warning and tracking distributed directly to affected forces and battle command systems
4. Precise, redundant, jam-resistant PVNT services
5. Advanced sensors for timely, tailorable WTEM[79]

Without this traceable link to Army Transformation Capabilities and Gaps, Army space capabilities and forces will not be accepted as a critical Objective Force enabler.

C. TRANSFORMING ORGANIZATIONS AND COMMAND LEVELS

Army Transformation will break down the Legacy Force construct which focused on the Army divisions. Following the first Gulf War the Army underwent a downsizing from 18 divisions to its current 10 divisions. There are currently four Army Corps' and two numbered Armies (see Figure 16).

78 Army in Space Brief, 8.

79 Ibid., 9.

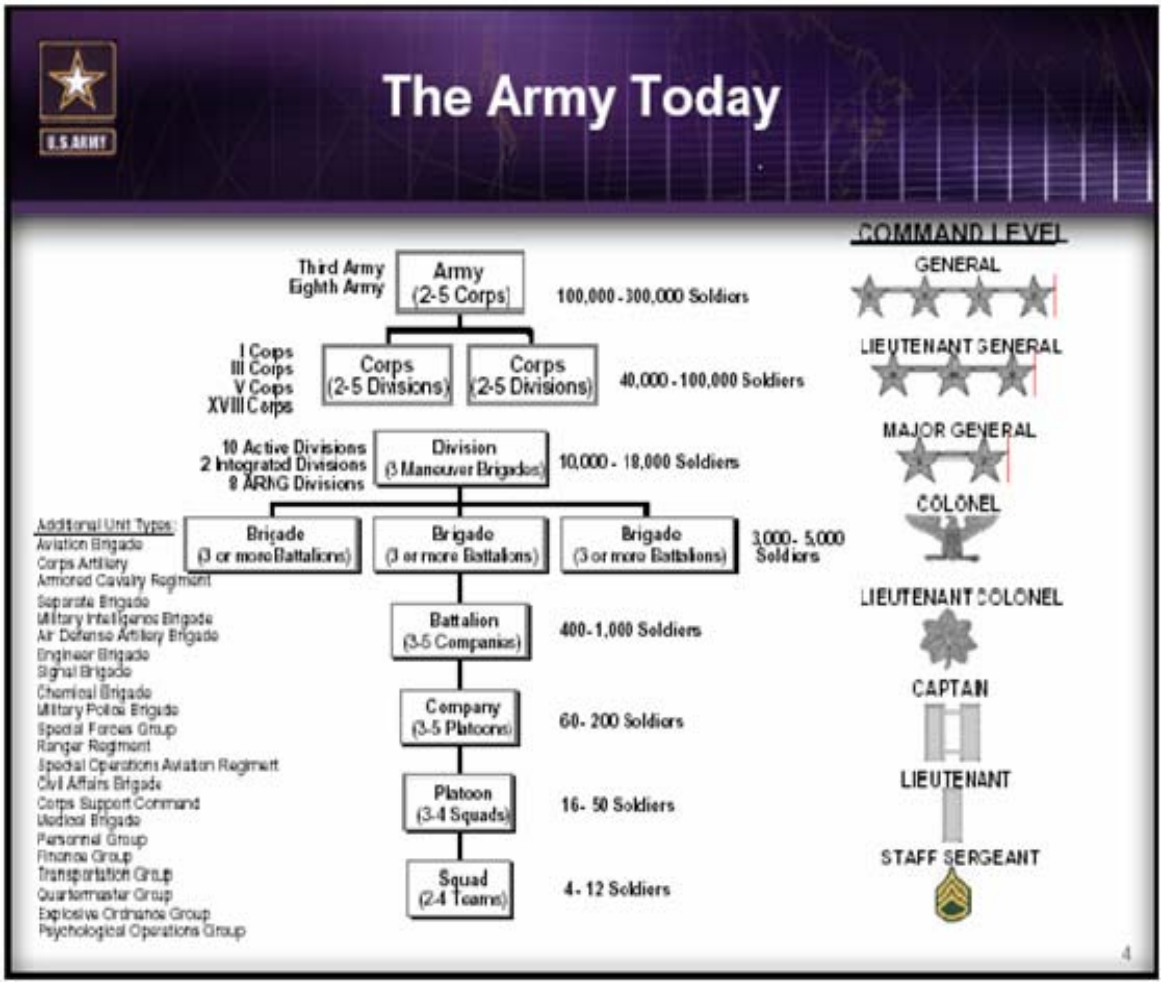

Figure 16. The Army Structure Prior to Transformation[80]

A Legacy division is made up of three maneuver brigades, an artillery brigade, an engineer brigade, an aviation brigade and a variety of other support units. All told, a Legacy division is made up of 10,000 to 18,000 soldiers depending on if it is a heavy or light unit (See Figure 17). When deployed to a theater of operation, the division strength doubles to roughly 30,000 with all of its sustainment augmentation. In subsequent figures in this chapter, note that "XXXX" is the symbol for a numbered Army, "XXX" is the symbol for a Corps, "XX" for a Division and "X" for a Brigade.

80 Department of the Army, *The Army Modular Force Brief.* (Washington, D.C.: 2004), 4.

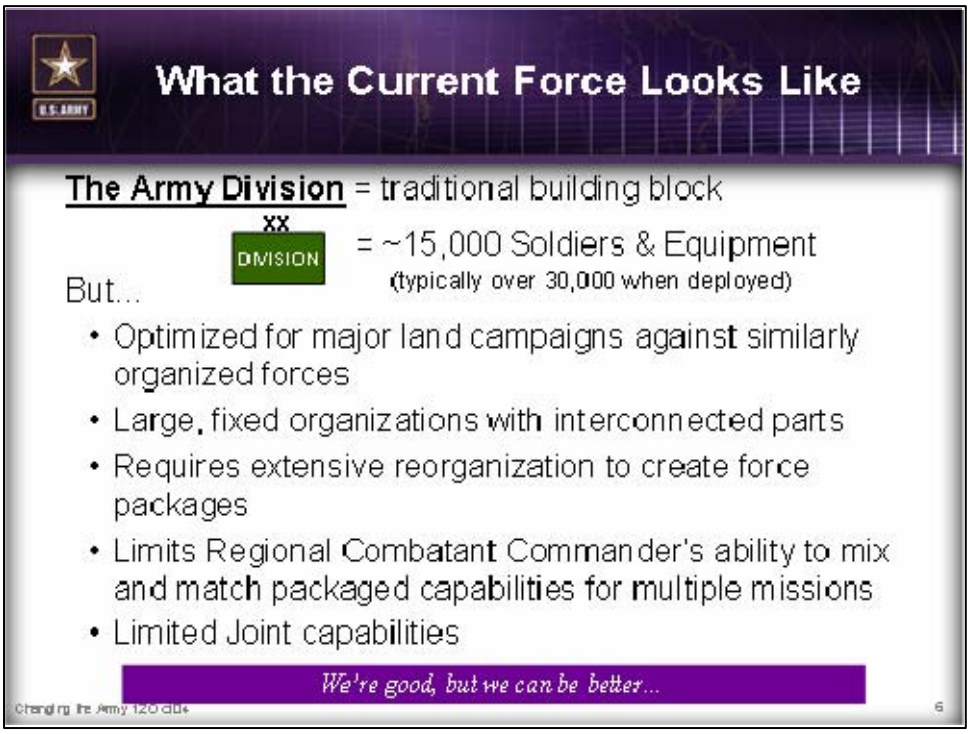

Figure 17. Army Legacy Division[81]

The primary component of the Legacy division is the brigade. Legacy brigades are composed of 3,000 to 5,000 soldiers and have unique equipment and capabilities. At the heart of Army Transformation is conversion of legacy brigades to Brigade Combat Teams/Units of Action (BCT/UA) and tailoring the UAs under a smaller, more efficient command structure at the UEx and UEy echelons. These modular UAs will be the building blocks for the Objective Force Units of Employment in contrast to the division-centric Legacy Force.

> The decisive effort of Army transformation is the creation of modular, combined arms maneuver Brigade Combat Teams (Units of Action), or BCT (UA). As part of this transformation, the Army migrates capabilities that were previously found at Division and Corps to the UA – the building block of combat forces in the Objective Force.[82]

The Legacy Force was not able to adapt its warfighting elements without adding non-organic forces or leaving behind organic units. Tailoring a Legacy Division required

81 *The Army Modular Force Brief*, 5.

82 *2004 Army Transformation Roadmap*, 3-2.

an intensive overhaul of the Division's existing structure and a great deal of time. Transformation focuses on building flexible, "plug-and-play" brigades/UAs that can be quickly packaged under a UEx command headquarters without losing effectiveness and lethality.

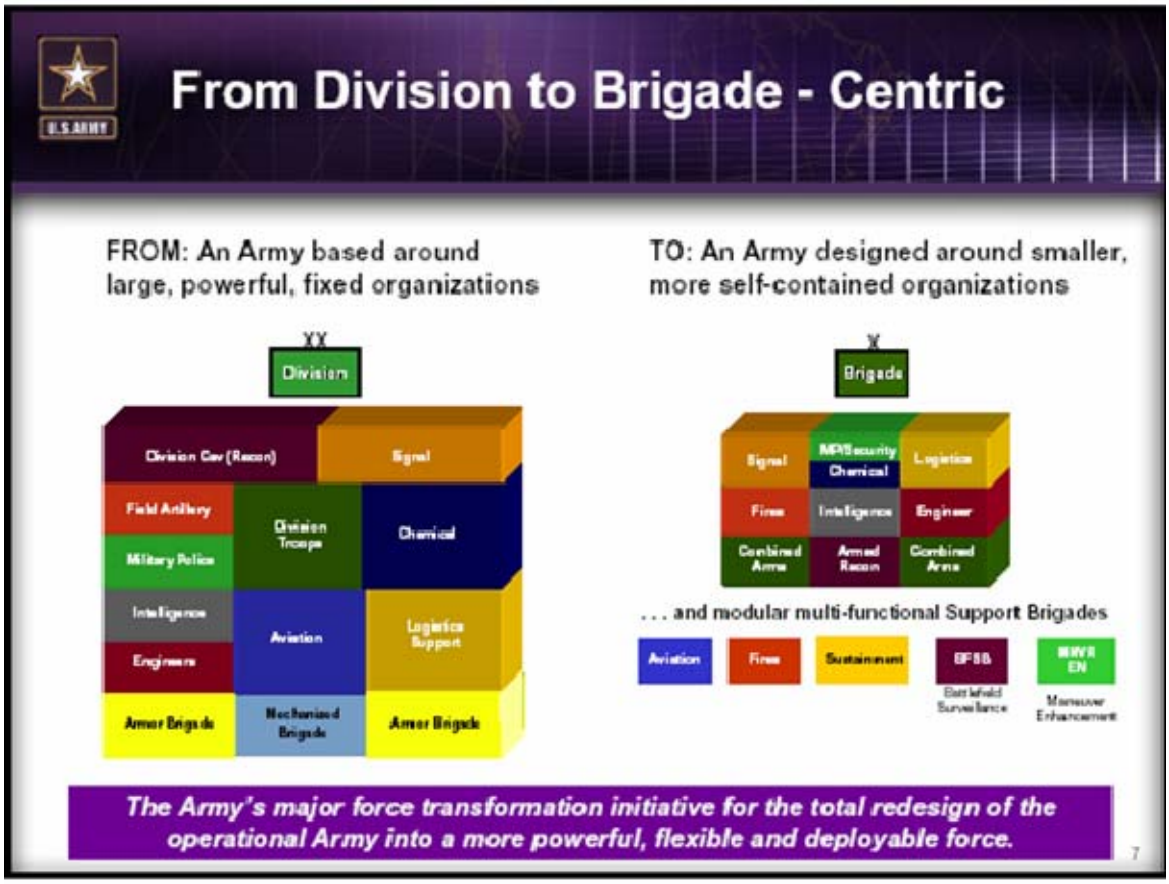

Figure 18. Transformation Shift to Brigade-Centric Construct[83]

Army Transformation will drastically change two aspects of its fighting forces – the command level structure and the primary warfighting organizations, the brigades. This paper will discuss the transforming command structures within the Army first. The command levels prior to Transformation are Division, Corps and Echelons above Corps (EAC) or Army-level (See Figure 19). Note that the Army uses UA, Brigade and BCT as interchangeable terms, UEx and Division as interchangeable terms, and UEy will be interchangeable with Corps, Army or Army Service Component to a Combatant

83 *The Army Modular Force Brief*, 7.

Command. Transformation will reduce the number of general officer command levels from three to two as shown in Figure 19. The UAs or BCTs will usually be commanded by a Colonel.

1. Units of Employment

Divisions, Corps and Armies command structures will be converted to Units of Employment (UE) in the Objective Force. There are two levels of UE. Division headquarters will be converted to UEx command elements and Corps and Echelons above Corps (EAC) headquarters will be converted to UEy command elements. A 2-star general will normally command the UEx organizations, consistent with the Legacy Division Command rank. A 3-star or 4-star general will command the UEy which is consistent with the Corps and EAC command rank. "The echelons are currently designated UEx, which normally has tactical and operational control of units of action, and UEy, which normally provides the Army's functional capabilities to the Joint Force Commander."[84]

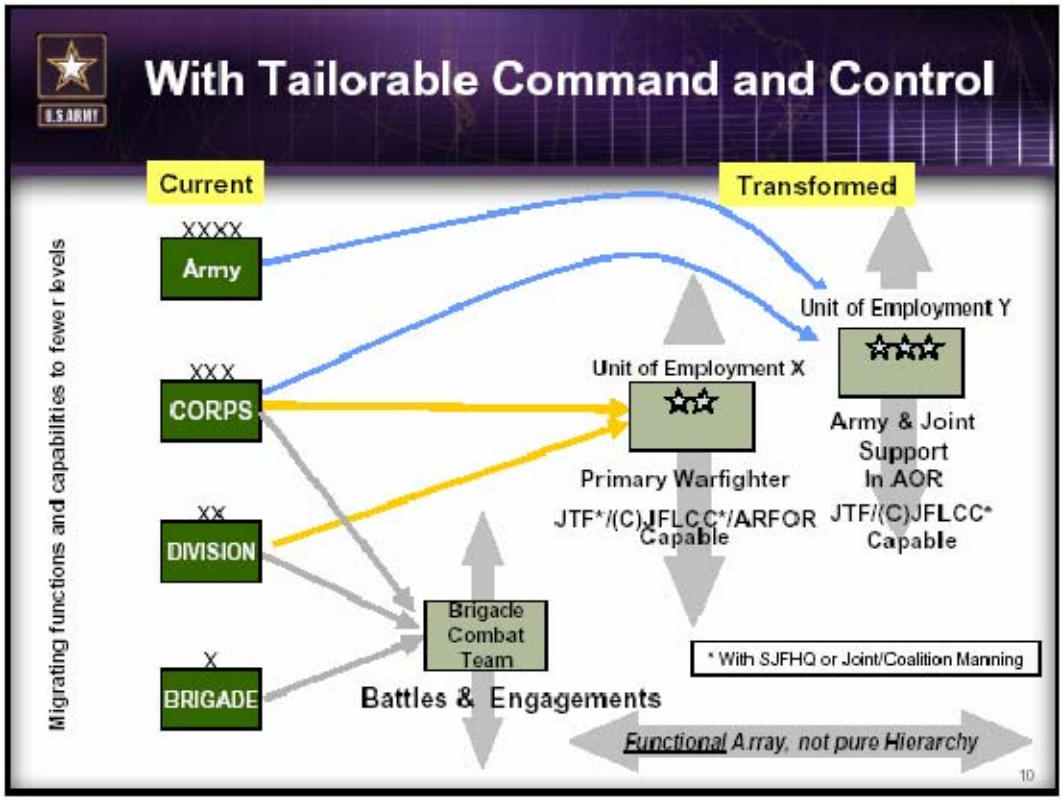

Figure 19. The Transformed Army Command Echelons[85]

84 *2004 Army Transformation Roadmap*, 3-5.

85 *The Army Modular Force Brief*, 10.

The UEx and UEy command elements are standing headquarters, much smaller than the pre-Transformational headquarters at Division, Corps and EAC. These new modular headquarters will command tailored force packages. The tailored force packages commanded by the UEx and UEy are made up of modular brigades to meet a specific regional threat or mission challenge. The modular brigades are called Brigade Combat Teams or Units of Action (UA) in Transformation terminology.

The UEy command echelon is a "concept under development for an Army theater-level headquarters to support regional combatant commanders."[86]The UEy command structure combines the current Corps and Army Service Component Commands and numbered Armies.

Figure 20 shows the UEy command organization, the sequence of numbers refers to the number of officers, warrant officers, enlisted soldiers and NCOs, and the total number of personnel within each element. An example is the "INTEL" block at the bottom left of Figure 20 which reads "29/13/26=68" which represents 29 officers, 13 warrant officers and 26 enlisted soldiers and NCOs for a total of 68 personnel in the Intel section of the UEy.

86 *2004 Army Transformation Roadmap*, 3-6.

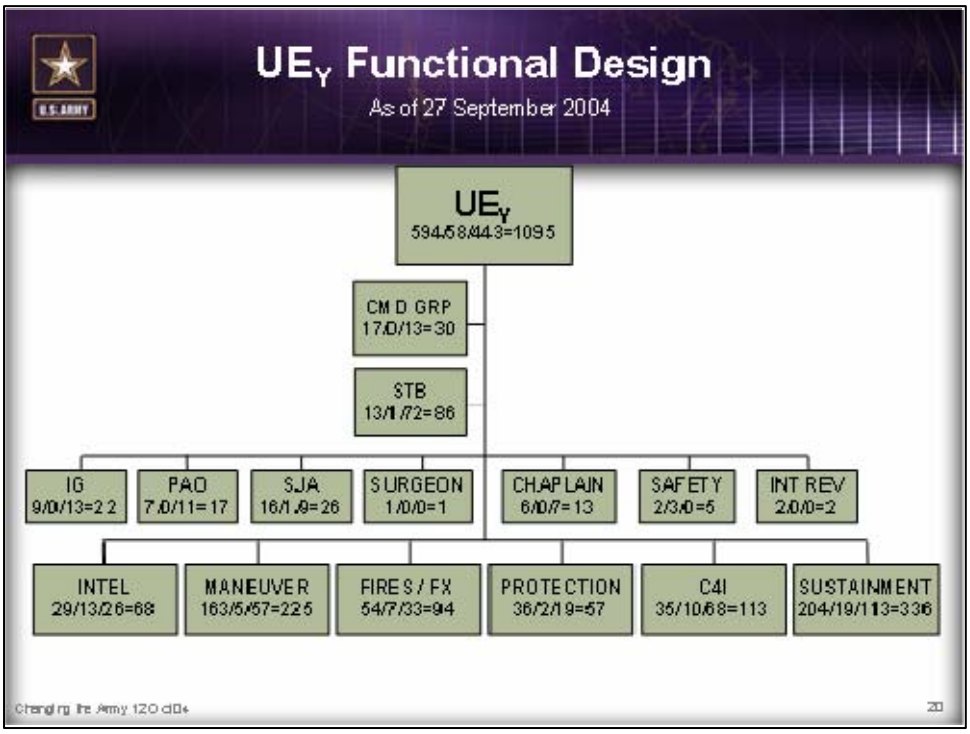

Figure 20. UEy Functional Organization Chart[87]

"The UEy would focus on the Army's component responsibilities for the entire theater's JIM operational land forces. During major combat operations, where the regional combatant commander is the Joint Force Commander, the UEy would normally become the Joint Force Land Component Commander (JFLCC) and exercise operational control over tactical land forces."[88] The UEy command echelon is still in the concept development phase, but UEx conversion has already begun.

"The UEx is the Army's primary tactical and operational warfighting headquarters. It is designed as a modular, command and control headquarters for full spectrum operations."[89] The UEx is an operational level headquarters with full Joint connectivity whereas the Division headquarters was strictly a tactical command echelon with very little Joint operations connectivity. The UEx command structure design is shown in Figure 21.

87 Department of the Army, *Modularity Overview: Changing the Army*. (Washington, D.C.: 2004), 20.

88 *2004 Army Transformation Roadmap*, 3-7.

89 Ibid., 3-5.

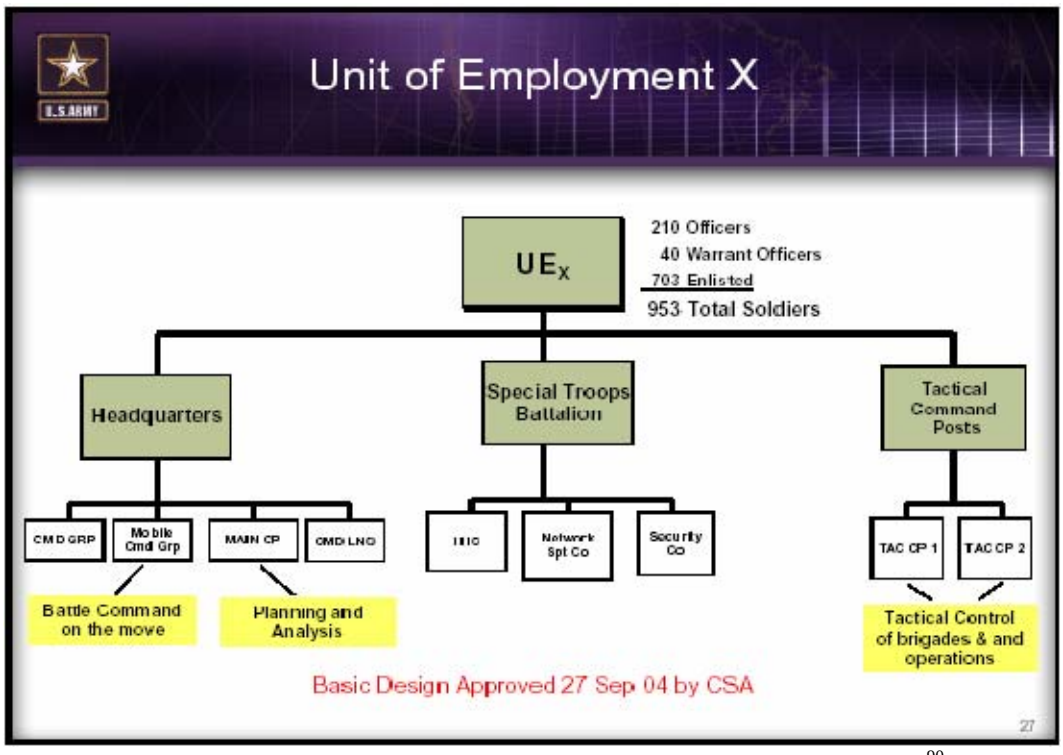

Figure 21. A Transformed UEx Command Echelon[90]

UEx headquarters are already in place, transforming the 3rd Infantry Division, 101st Airborne Division, 4th Infantry Division and the 10th Mountain Division. These new UEx headquarters command and control up to six maneuver brigades or UAs, compared to the Legacy Division construct which had a rigid three-brigade organization. An example of a UEx force package is shown in Figure 22. These brigades/UAs are the focus of Transformation with respect to the second aspect of Transformation – the warfighting units' force structure; just as the Division, Corps and EAC headquarters where the focus for transforming command and control echelons.

90 *The Army Modular Force Brief*, 20.

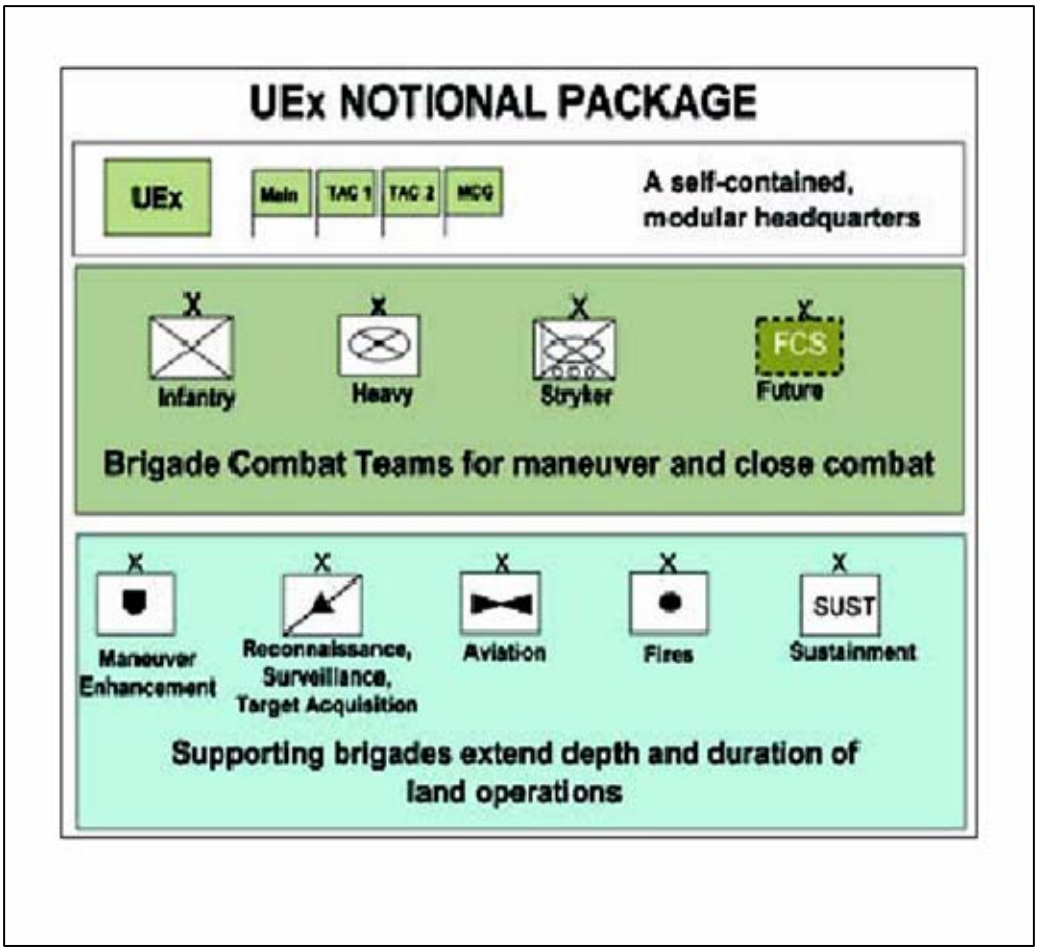

Figure 22. Example of a UEx Force Package[91]

2. Units of Action

The transformed brigade combat teams (BCT) or UA will have roughly 4,000 soldiers, a standardized headquarters and a modular self-contained structure. This is much different from the legacy division where brigades rely on divisional assets for support and divisions have unique support and command relations that make deviation from "normal" deployment very difficult. Transformation is about developing modular, self-contained brigade building blocks - the UA's, and tailoring the UEs based upon the specific needs of a supported regional Combatant Commander. A UEx would have a standard and greatly reduced headquarters structure which could adapt the necessary number and type of UAs into a flexible fighting force capable of rapidly adapting to meet the unique threat and environmental challenges of the Regional Combatant Commanders.

91 *2004 Army Transformation Roadmap*, 3-6.

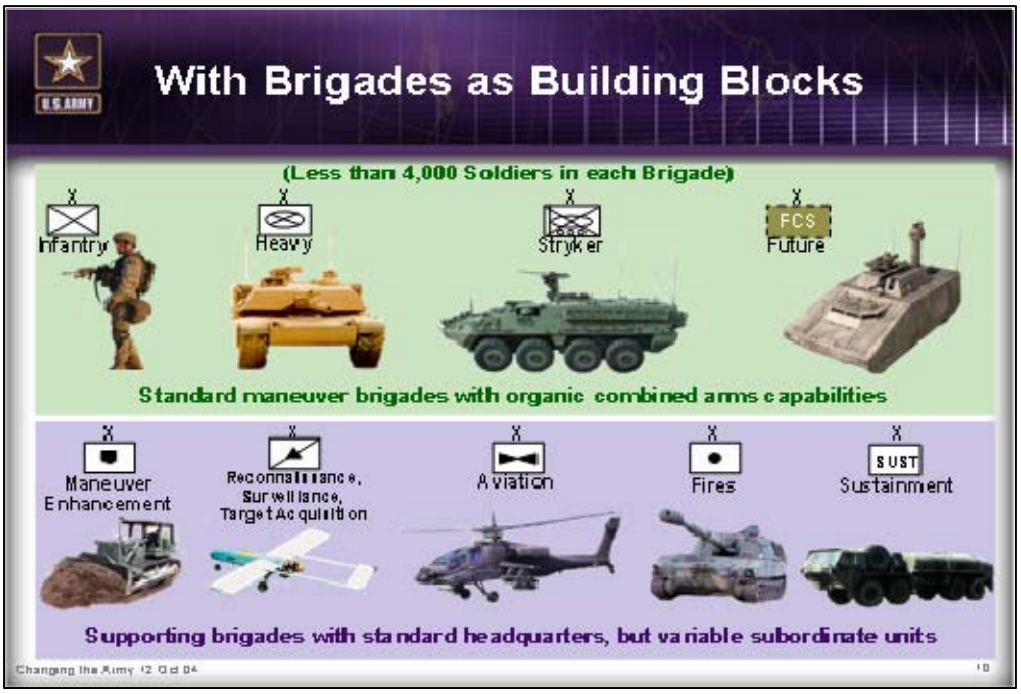

Figure 23. Brigade Combat Teams (Units of Action, UA)[92]

An example would be the current requirement for more Military Police (MP) units in Iraq while the need for artillery support has all but disappeared. Under the legacy construct, a Division would deploy with its organic artillery and MP units. Any change in their respective numbers through augmentations and additions would be done "on the fly" and would have many support and command and control (C2) problems associated with such a change. Under the Transformational construct, a UE command element would be assigned functional UA's based upon the operations requirements, not on a rigid organic structure. These UA's would be designed to quickly plug into the UE command structure and immediately execute their assigned tasks with a reduced dependency on the UE for support due to their self-contained nature. If more MP units were required, additional MP UAs would be assigned to the UE and unneeded artillery UAs would not be apportioned.

D. SPACE SUPPORT TO THE TRANSFORMED ARMY

The focus of Army Transformation on Joint operations affects all functional areas including Space. Although space has been formally recognized as an inherently joint mission area for decades, the nature of Army Space is also forced to change with

92 *The Army Modular Force Brief*, 8.

Transformation. The most prominent evidence of this transformation of Army space is in the emerging force structure corresponding to the UAs and UEs. Where should Army Space operations personnel be located in the UA, UEx and UEy organizations? Should space operators be a part of each? Understanding a Transformed space support organization is dependent upon understanding past and existing space support units.

The ARSSTs (Army Space Support Teams introduced in Chapter II) are part of the 1st Space Battalion in Colorado Springs and belong to the 2nd Space Company (ARSST). The ARSSTs deployed throughout the 1990s to support Division (transforming to UEx) and Corps (transforming to UEy) headquarters in exercises and warfighting operations. The ARSST teams are attached to a higher headquarters and deploy with that unit as needed – the ARSSTs are not organic to the UEx or UEy command echelons. Because of Army Transformation, the method by which space support was provided began to shift to organic space support for tactical units (UEx and below) vice attached ARSST teams that were deployed in an ad hoc manner when needed to support a Corps or higher (UEy and above). Army Transformation has caused a major change in the concept of space support and to Army space force structure.

> The goal is to keep pace with Army transformation processes. The optimum end state may be to have special staff sections that are organic to land component commanders, corps commanders, and (potentially) division commanders.[93]

This quote from the Army Space Master Plan (signed March 2000 by the Commander of SMDC) stated the need for organic space operations support at Division, Corps and Land Component Commander (LCC) levels – the transformed UEx and UEy command structures. The Army Space Master Plan was a roadmap to normalize, operationalize and institutionalize Army space in the transforming Army. The key to normalizing space is to create organic space elements in the tactical units, particularly the Divisions.[94] Over the next several years this possibility became reality in the form of the Space Support Element (SSE).

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93 Department of the Army, *United States Army Space Master Plan*. (Washington, D.C.: US Government Printing Office, 2000), 4-11.

94 *Army Space Master Plan*. 2-23.

The original or objective construct of the SSE force structure is for a 6-man element. SMDC established the SSE force structure in 2002 with a Force Design Update (FDU) which was submitted to the Department of the Army for Chief of Staff approval. Chapter IV will go into more depth on the SSE FDU. The SSE was to be comprised of four FA40 Space operations Officers and two communications non-commissioned officers (NCO).

The SSE members would be located in the UEx Main Command Post (CP), Tactical CP #1 and Tactical CP #2. The CPs are part of the UEx Operations (G3) staff sections of the existing ten Divisions (four of which are now converted to the UEx construct). The SSEs will be part of the UEx command headquarters unlike the ARSSTs that were attached or "farmed-out" from ARSTRAT in Colorado Springs to support various Service and Joint units. The SSEs will be organic to their UEx.

As Army Transformation proceeded and the UEy, UEx and UA concepts emerged, SMDC force developers also proposed that the SSEs be organic elements of the UEy. Additional proposals were for Space Operations Officers to be organic to the Fires UA, Reconnaissance, Surveillance and Target Acquisition (RSTA) UA. The ARSST teams also remain as augmentation space assets under ARSTRAT control to support contingency operations. Redundant levels of organic space support will be in place at the UA, UEx and UEy if all of these proposed space force design actions are implemented.

> The ARSSTs are rapidly deployable teams that provide Space Force Enhancement support and Space Control awareness primarily at the Corps (UEy) level. Regardless of the echelon, the teams deploy and integrate into the supported unit staff. The ARSSTs single focus is to provide relevant, timely Space-based products and support that enhance the ability of the warfighter to dominate the battle space and engage the enemy decisively.[95]

In December 2004, the Chief of Staff, Army decided that the SSE force structure identified in the FDU be decreased from six soldiers to two. In February 2005, SMDC

95 Hotop, Dave. "Space Force Enhancement: Army Space Support Teams in OIF" *The Army Space Journal*, Special Edition, 52.

submitted an amended FDU which would authorize a force structure of four soldiers for the SSE. This latest FDU has not yet been approved by the Chief of Staff, but UEx SSEs are currently being fielded as 4-man elements.

Of the ten Legacy Divisions, three are now modularized in the BCT/UA structure. The 3rd Infantry Division, 10th Mountain Division and 101st Airborne Division have modularized BCTs and organic SSEs. The total number of SSEs supporting UEx and UEy organizations will be twenty-seven in 2009. Of those twenty-seven SSEs, nineteen will be active component elements and eight will be reserve component and National Guard elements. Table 3 shows the schedule as of March 2005 for the SSE support fielding to the active duty UEs.

	FY 05	**FY 06**	**FY07**	**FY 08**	**FY09**
Active Component UEx (2-Star Cmd)	101st Airborne Division 4th Infantry Division(ID) 2nd ID 10th Mountain Division	1st Cavalry Division 25th ID 82nd Airborne Division	1st Armored Division 1st ID		
Active Component UEy (3-Star Cmd)	I Corps	III Corps XVIII Corps	V Corps		
Active Component UEy (4-Star Cmd)	3rd Army ARCENT ARNORTH	7th Army USAREUR	USARSO	USARPAC	8th Army USFK

Table 3. UEx/UEy SSE Fielding Schedule[96]

The modular structure of the UEs in Figure 23 shows two elements called the Fires UA and the Reconnaissance, Surveillance and Target Acquisition (RSTA) Brigades. Combat developers within the Army Space community believe that Fires and RSTA UAs or Brigades are other organizations that could possibly require organic support from space operations personnel. SMDC has proposed that one FA40 Space Operations

96 U. S. Army Space and Missile Defense Command FA40 Proponent Office, *FA40 NPS Orientation Brief*, (Washington, D.C.: 2005), 20.

Officer (SOO) be assigned to each Fires Brigade and two SOO's and one non-commissioned officer (NCO) be assigned to each RSTA Brigade. This embeds space support to the tactical level at both the UE/Divisional and UA/Brigade levels.[97]

97 FA40 NPS Orientation Brief, 19.

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IV. THE SPACE SUPPORT FORCE STRUCTURE

A. OVERVIEW

SMDC established Army Space force structure in the Objective Force through Force Design Updates. This chapter identifies where the Army Space Support Elements will be located in the Units of Employment. The debate within the Army continues, what will be the final strength of the Space Support Elements within the UEx?

The space capabilities provided by the Space Support Elements will be shown in relation to Army mission areas. Space-unique tasks, enhancing tasks and critical tasks of the Space Support Elements are presented in this chapter. The personnel strength of the Space Support Element and the space tasks they are to perform are critical issues. Do Space Support Elements provide unique products and services or do they simply enhance other staff element operations? If they are a redundant capability, how many space operators should be dedicated to this segment of the Army's space mission?

B. SPACE SUPPORT FORCE STRUCTURE

The USASMDC's Directorate for Combat Development (DCD) designed the UEx SSE in 2003 as a 6-man element containing four Space Operations Officers and two non-commissioned officers (NCO). The vehicle for this SSE structure design to support the UEx is the Force Design Update (FDU). DCD designed the UEx SSE at a manning level of six to provide around-the-clock space support, planning and operations at the UEx Tactical 1 (TAC1) Command Post (CP) and an embedded space support, planning and operations presence in the UEx Main CP and the Tactical 2 (TAC 2) CP. The fourth UEx CP, the Mobile Command Group (MCG), has no dedicated SSE element in the FDU. The FDU manned the UEx Main CP with one Major; the TAC1 CP with one Lieutenant Colonel, one Major and one Staff Sergeant; and the TAC2 CP with one Major and one Staff Sergeant. All of the officers in the SSE FDU are FA40s, Space Operations Officers (SOO). The Staff Sergeants in the TAC1 CP and TAC2 CP are Senior SATCOM

Systems Operators – Maintainers, Signal Corps NCOs. Figure 24 shows the SSE support to the UEx with a 6-man element.[98] The SSE equipment set for the SSE's CP support elements will be further addressed in Chapter VI.

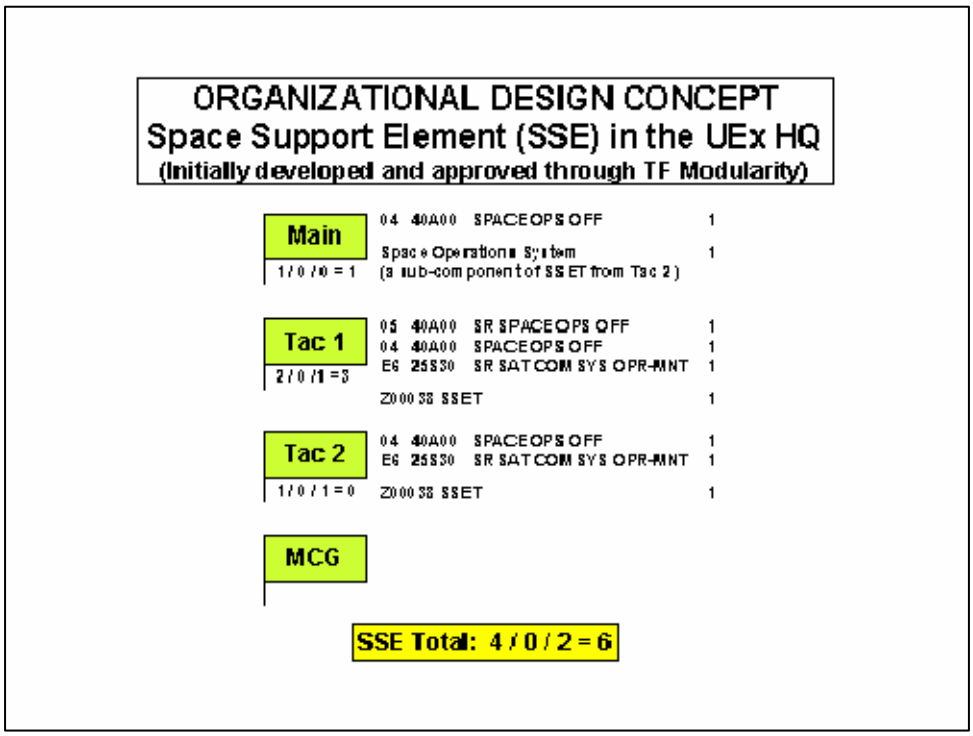

Figure 24. SSE Support to UEx [99]

The FA40 Major located in the Main CP is the SSE's primary planner, working with Main CP's Plans Division in both the deliberate and crisis action planning processes. He prepares the Space Annex, Annex N, for the UEx Operations Plans and Orders and the space estimate. He will also assist the G2 in conducting Intelligence Preparation of the Battlefield (IPB) and provide the G2 with the space segment for the IPB.[100] Figure 25 shows the personnel, equipment and a list of functions (not all-inclusive) that the FA40

98 United States Army Space and Missile Defense Command. *Operational and Organizational Concept Paper for the Space Support Element (SSE) in the Unit of Employment x (UEx)*. (Washington, D.C.: 2005), 6-9.

99 Ibid., 9.

100 Ibid., 6.

may perform at the Main CP. The SSE element in the Main CP cannot support 24-hour operations, nor does it have the network connectivity possessed by the TAC 1 and TAC 2 SSE element.

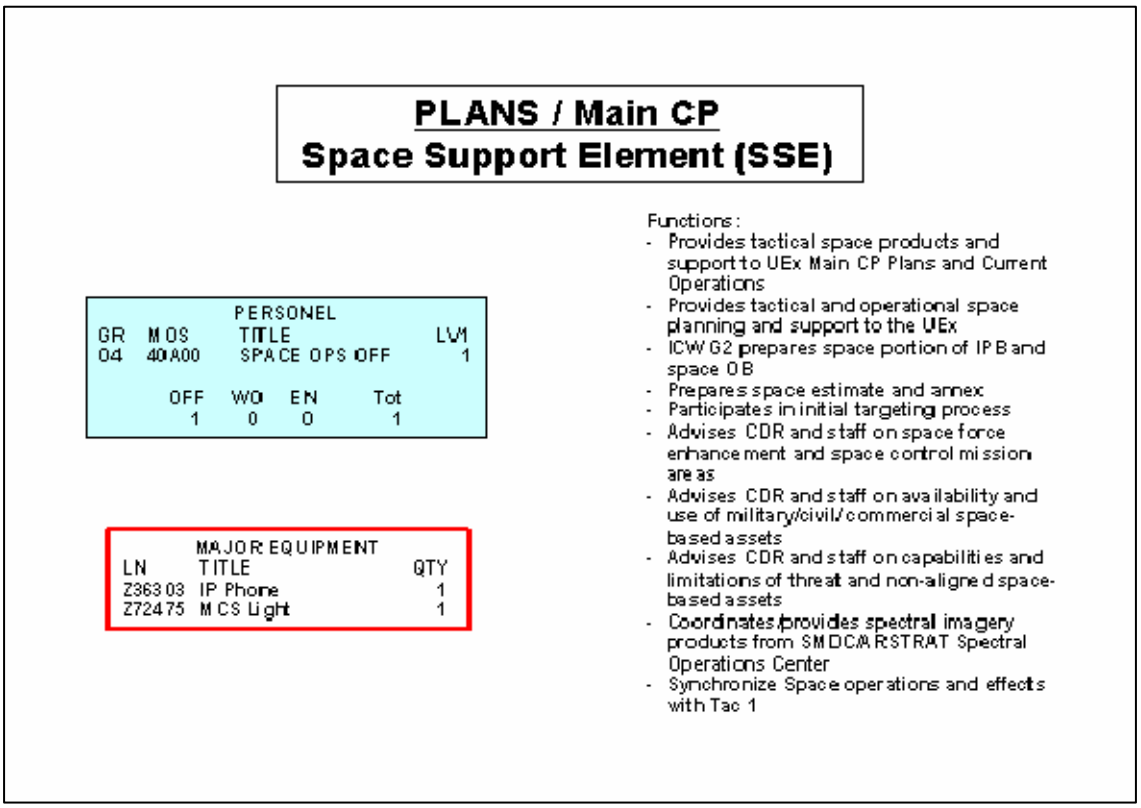

Figure 25. SSE Support to UEx CPs[101]

The TAC 1 and TAC 2 CPs are designed to perform the same functions. However, because the UEx's primary staff members reside in the TAC 1 CP, the SSE element in the TAC 1 CP is designed to support 24-hour operations, and is thus manned with three personnel including the FA40 Lieutenant Colonel. The TAC 2 CP usually employs primary staff deputies. The TAC 2 CP is designed for a 2-man SSE slice that is not capable of supporting 24-hour operations.[102] Figures 26 and 27 show the TAC 1 and

101 *Operational and Organizational Concept Paper for the Space Support Element (SSE) in the Unit of Employment x (UEx)*, 10.

102 Ibid., 6-8.

TAC 2 CP SSE support design. Note that the "Force Application / Tac 1" title does not indicate that these elements are performing actions in the Force Application mission area. They are specifically designed to perform Force Enhancement functions.

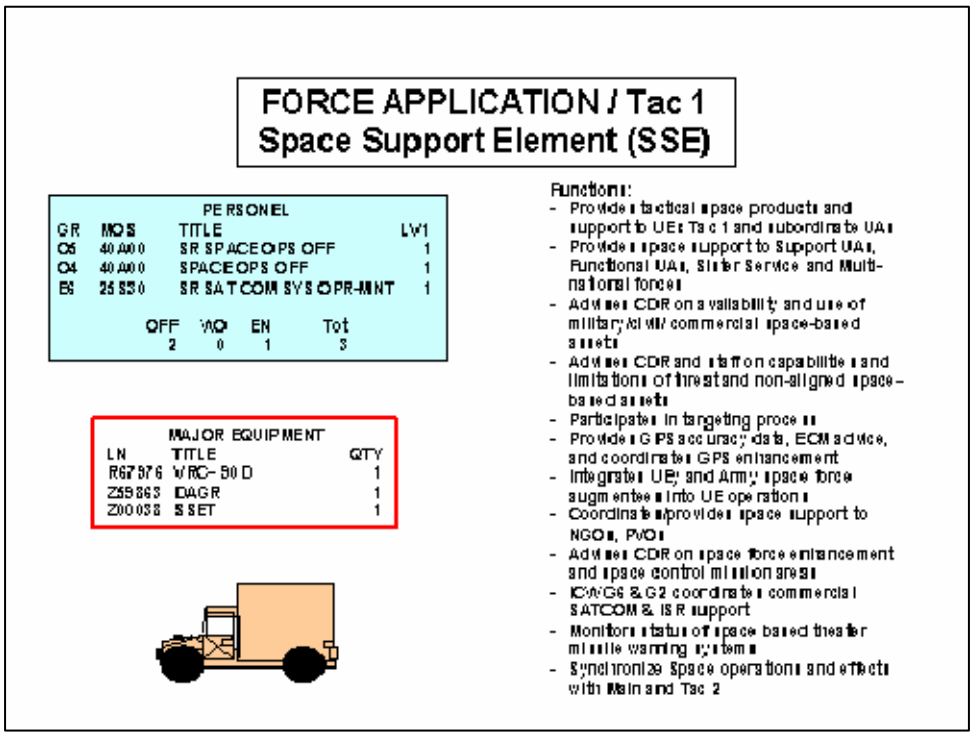

Figure 26. SSE Support to TAC 1 CP[103]

103 *Operational and Organizational Concept Paper for the Space Support Element (SSE) in the Unit of Employment x (UEx)*, 11.

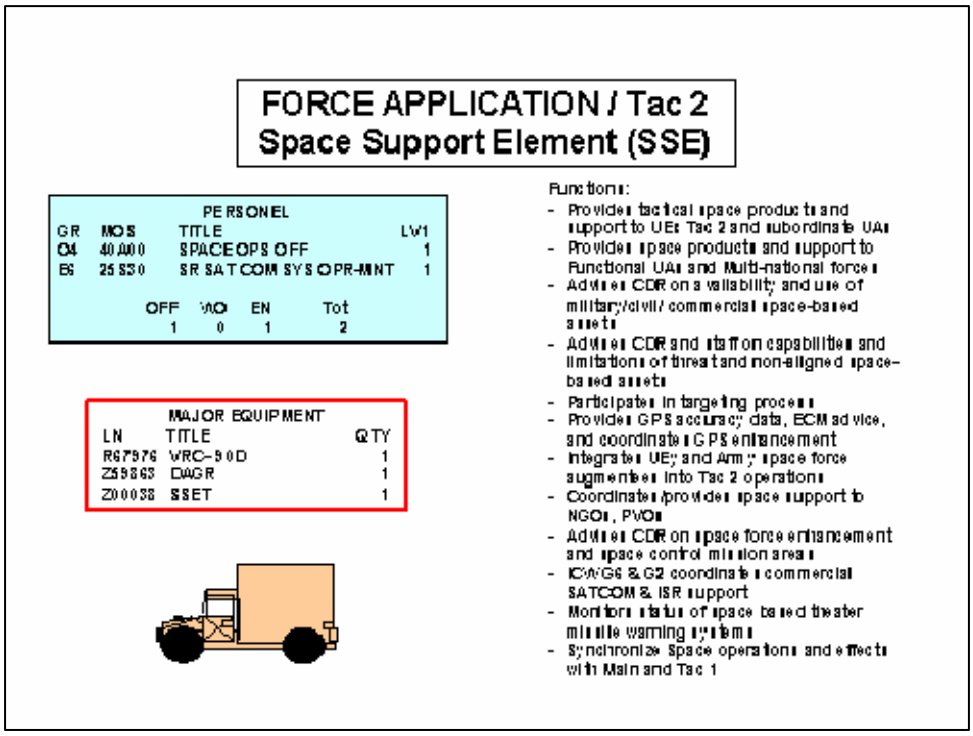

Figure 27. SSE Support to TAC 2 CP[104]

In September 2004, the Chief of Staff, Army (CSA) disapproved the FDU that would have established the 6-man SSE. The disapproval directed the UEx SSE be reduced from six personnel, the objective SSE design in the FDU, to two personnel. This decision eliminated the two SATCOM NCO's and two Space Operations Officers in TAC1 and TAC2 and left a force structure in the Main CP consisting of two FA40s, a Lieutenant Colonel and a Major. This SSE design is shown in Figure 28. The CSA disapproval was driven by the recommendation of the Combined Arms Doctrine Directorate (CADD) at Fort Leavenworth, Kansas. This decision effectively eliminated 24/7 capability for space operations in the three UEx CPs as designed by the original FDU and consolidated all of the remaining space operations personnel at the Main CP.[105]

The rationale for the CADD disapproval recommendation and ensuing UEx SSE force reduction is a change to the UEx operational concept. The original SSE FDU was

104 *Operational and Organizational Concept Paper for the Space Support Element (SSE) in the Unit of Employment x (UEx)*, 11.

105 *Operational and Organizational Concept Paper for the Space Support Element (SSE) in the Unit of Employment x (UEx)*, 2.

designed to support sustained JTF operational capability as directed. The UEx operational concept was subsequently changed from a "sustained" JTF operational capability to an "initiated" JTF operational capability. CADD's position is that all remaining space operations capability can be consolidated at the Main CP and the TAC 1 and TAC 2 CPs can be supported via networked systems.[106]

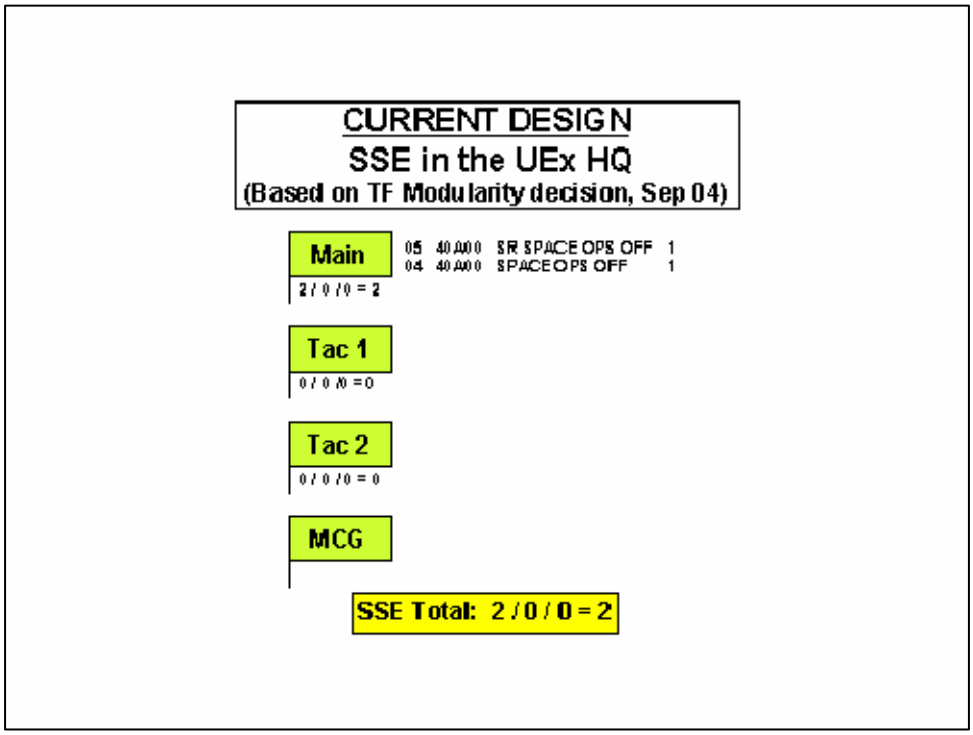

Figure 28. Modified SSE Design[107]

The SMDC DCD is coordinating with CADD to resolve the differences in regard to designed and operationally required SSE force structure. Any FDU update that does not have the concurrence of the CADD will most likely be disapproved by the CSA. SMDC initiated a change to the SSE Force Design Update in February 2005 to regain some of the space support operations capability and force structure in the UEx. The CADD supports the addition of the two Signal NCOs from the original FDU to the FDU

106 *Operational and Organizational Concept Paper for the Space Support Element (SSE) in the Unit of Employment x (UEx)*, 2.

107 Ibid., 5.

change documentation. "CADD recognized the requirement for two NCOs and changed their position; however, we were unable to resolve the issues relating to the number and duty location of the FA40 Space Operations Officers (SOO)."[108]

SMDC agrees that the space operations personnel in the SSE can be consolidated at the Main CP, but maintains that at least three FA40s must be in the SSE. The SMDC submitted this FDU update and is awaiting approval or disapproval of this amended UEx SSE design. It is likely that the CSA will approve a 4-man SSE structure for the UEx as recommended by the CADD. SMDC will continue to man the UEx SSEs to the objective strength of six until the final decision on this issue has been made. The manning of the SSEs is a critical aspect for the entire Army space community. The FA40 manpower pool is very small, approximately 150 officers. A force structure change from a 2-man SSE to a 4 or 6-man SSE has huge impacts on the ability of FA40 personnel to support both the tactical and operational warfighters and the strategic-level space billets the Army fills. The FA40 manpower issues and conflicting requirements will be specifically addressed in Chapter V.

C. MISSIONS FOR THE OPERATIONAL SPACE SUPPORT ELEMENTS

The 1st Space Brigade codified a list of capabilities that the Army has requested from space assets. This list of capabilities is traced from Army Transformational documents and from the Brigade's space assets participation in Joint and Army exercises and experimentation, SSE and ARSST operations in Iraq and Afghanistan, and the development of Army Space doctrine; concepts; plans; and tactics, techniques and procedures (TTP). The Space Brigade also used over ten years of experience in deploying ARSSTs in support of various levels of command.

The Space Brigade broke the Army's Space needs down into three groupings; Battle Command, ISR, and Situational Awareness. The Army Space capabilities are shown in Table 4 with respect to these three enabled mission areas:

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108 United States Army Space and Missile Defense Command. *Memorandum for Record: Rebuttal of CADD Non-concurrence to USASMDC Force Design Update UEx Space Support Element*. (Washington, D.C.: 2005), 1.

Army Mission Area	Supporting Space Capability
Battle Command	Battle command on the move Modularity Distributed mission planning/rehearsal/trng Continuous C2 Global secure communications Precision navigation and timing Reachback
ISR	Real-time ISR Precision navigation and timing Global WTEM
Situational Awareness	Early warning Joint Blue Force Tracking Dynamic retasking Precision navigation and timing Detection and avoidance of Obstacles In-transit total asset visibility

Table 4. Space Capabilities Supporting Army Needs[109]

From the Transformation framework and the work done by the 1st Space Brigade, the Future Warfare Center's Training Division within SMDC developed an initial mission statement for the SSEs in support of their UEx. The mission of the SSE is "ensure the planning, integration and coordination of the space mission areas into UEx plans, orders and operations."[110] The Training Division then developed a list of critical tasks that the SSE must be able to perform to execute this mission statement.

109 Story, Kurt, Army Theater Space Support in Joint Operations Brief, (Colorado Springs, CO.:2005), 2.

110 Dow, Richard, *Space Support Element (SSE) Overview to the FA40 Conference*, (Colorado Springs, CO.: 2005), 3.

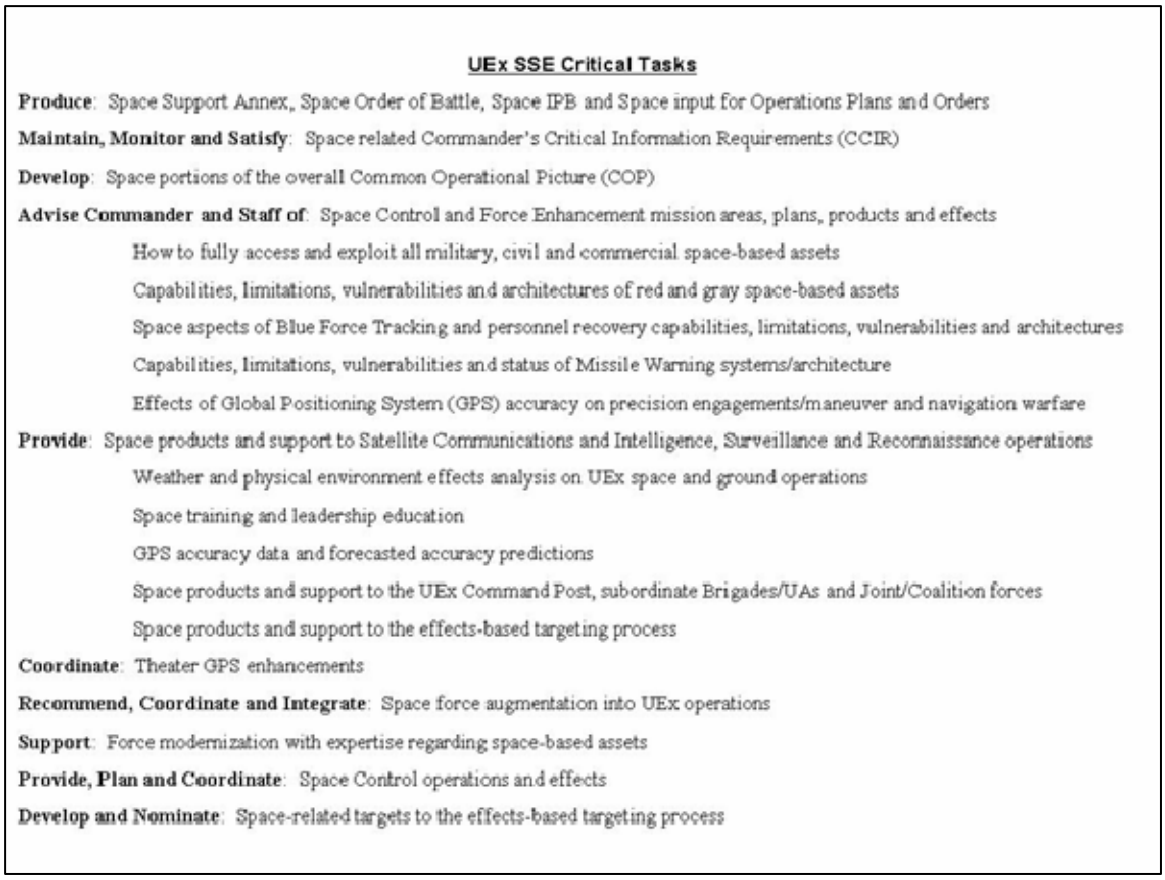

Figure 29. UEx SSE Critical Tasks[111]

Based upon the 3rd ID's experiences in Iraq, the critical tasks identified by the Training Division were arranged into two categories. Those categories were SSE Unique Tasks and SSE Enhancing Tasks. The distinction arises from the numerous mission areas that overlap between the Army Signal, Intelligence, Space communities and others. The issue revolves around whether the organic SSE is providing a unique space capability or simply helping to enhance a capability being provided by other staff sections. The ability to provide a unique capability to a supported UEx is essential to validating the SSE and overall space support concepts and force structure. The Unique and Enhancing tasks are shown in Table 5:

111 Brozek, Dennis, *UEx Space Support Element (SSE) Support to the Warfighter Brief*, (Fort Drum, NY: 2005), 8.

SSE Unique Tasks	SSE Enhancing Tasks
Space Intelligence Preparation of the Battlefield (IPB)	Support to Space Weather Analysis
Theater and Global Reach to Space Forces	Support to GPS Analysis
Development of Space-Related Targets	Support to Battlefield Characterization
	Support to Blue Force Tracking
	Support to Imagery and Topography

Table 5. SSE Unique and Enhancing Tasks[112]

All of these tasks fall under the mission area of Space Force Enhancement. It is important to note there is a significant difference between the Space Essential Tasks and METL tasks identified earlier. The Space Essential Tasks initially identified in TP 525-3-14 and in the Space Brigade/Battalion METL tasks specifically mention the Space Control mission area. The SSE tasks are Force Enhancement centric.

It is also important to note the unique tasks, Space IPB and Space Targeting are space-centric subsets of established Army targeting and IPB doctrine and processes. It is arguable that Theater and Global reach to Space Forces is a function of communications reachback not a stand alone, unique space capability.

The previous paragraph is possibly the most damaging argument against dedicating force structure and resources down to Brigade/UA and UEx level; SSEs are in fact very useful, but they are doing tasks that augment another staff element's function. The mission area where that is not the case is Space Control. The force structure has been established for a Space Control Company in the 1st Space Battalion. A fielded, tactical Space Control system that could quickly deploy and support any level of command in any Service or Joint headquarters is an undeniable, space-unique task. The issue of fielding such a capability and equipping the Space Control Company will be addressed in Chapter VI.

112 Dow, Richard, *Space Support Element (SSE) Overview to the FA40 Conference Brief*, (Colorado Springs, CO.: 2005), 6.

V. MANNING THE SPACE FORCE

A. OVERVIEW

The Army's space mission area is the responsibility of the Space Operations Career Field, FA40. The FA40 Career Field is a relatively new development, beginning in the mid '90's. The ability to pursue a career path solely in the space mission area enables space operations officers to gain and utilize space expertise while remaining competitive for promotion.

The 2001 Space Commission, chaired by the Honorable Donald Rumsfeld, directed that all Services establish a Space Cadre. The FA40 Space Operations Officers are the core of the Army's Space Cadre. A Space Force Management Analysis is underway in the Army to identify what officers, enlisted personnel and civilians will be part of the Space Cadre.

There are three levels of manning requirements to which FA40s are assigned. This chapter identifies those levels and discusses the tradeoffs and personnel shortfalls that occur in order to embed organic Space Support Elements at the UEx, UA, or UEy levels while still maintaining the 1st Space Brigade units. Determining the proper allocation of the small number of FA40s in the Army is an ongoing effort and debate within the Army Space community.

B. EMERGENCE OF THE FA40 SPACE OPERATIONS OFFICER

The Army Functional Area 40 (FA40) is also called the Space Operations functional area. It is part of the Information Operations (IO) Career Field within the Army. There are four Career Fields within the Army; Information Operation, Operations, Operations Support, and Institutional Support. The Career Field (CF) designation began in 1998 and enabled officers to continue their careers in career fields other than their basic branch and still progress through the ranks. Officers electing to leave their basic branches become part of the Information Operations, Operations Support or Institutional Support Career Fields depending on their selected Functional Area. FA40s enter the IO Career Field. Those officers choosing to remain within their respective basic branches become part of the Operations Career Field.

Information Operations CF	**Institutional Support CF**	**Operations Support CF**	**Operations CF**
FA24 Information Systems Engineering	FA43 Human Resources Management	FA48 Foreign Area Officer	Basic Branches
FA30 Information Operations	FA45 Comptroller	FA51 Army Acquisition Corps	FA39 Psychological Operations (PSYOP) and Civil Affairs
FA34 Strategic Intelligence	FA47 USMA Permanent Instructor		FA90 Multifunctional Logistician
FA40 Space Operations	FA49 Operations Research/Systems Analysis		
FA46 Public Affairs	FA50 Force Management		
FA53 Information Systems Management	FA52 Nuclear Research and Operations		
FA57 Simulation Operations	FA59 Strategic Plans and Policies		

Table 6. Career Fields with Corresponding Functional Areas[113]

The population size of the Information Operations Career Field is the smallest of the four categories. The distribution within the Army is 69% in the Operations CF, 14% in the Operations Support CF, 10% in the Institutional Support CF, and 7% in the Information Operations CF.[114] The FA40 officer pool is a very small group within the Army and numbers roughly 150 officers.

Officers select their desired CF at the ten-year mark in their careers. Once approved to enter the FA40 CF, officers do not return to their basic branches for assignment. They will be assigned in FA40 positions for the rest of their career. This is important because most FA40s will not develop Space Operations experience until they

113 Driscoll, Jerome, *FA40 Conference Update Brief*, (Alexandria, VA: 2005), 8.

114 Ibid., 4.

are Majors with 10 or more years of service. The CF will be inexperienced compared with the rank structure of the Operations CF, and even more so when compared with the Air Force's Space community.

The FA40 CF has two separate tracks, which are called areas of concentration (AOC). The AOCs for FA40 are the Space Operations Officer (AOC 40A) and Astronaut (AOC 40C). The Army currently has seven 40Cs assigned to the National Aeronautics and Space Administration (NASA).

The Army FA40s are specifically identified as members of the DoD Space Cadre in Department of the Army Pamphlet (DA Pam) 600-3, Commissioned Officer Development and Career Management. "The Army requires officers that are technically trained and tactically experienced in the integration of all space capabilities to support Joint land component operations."[115] This unique role is the responsibility of the FA40A. The Army has tasked the FA40As to provide the ground commanders with integrated space capabilities to enhance military operations across the full spectrum of conflict. DA Pam 600-3 specifies that the FA40s provide expertise and advice in the following areas:

(a) Basic orbital mechanics, space operations, and space effects.
(b) Space analysis and planning to support Army, Combined Arms, Joint, Interagency, Intergovernmental and Multinational (JIIM) operations.
(c) Utilization and integration of space capabilities with terrestrial, air, and near-space based systems owned by the DoD, Intelligence Community, Civil Agencies and commercial partners to provide integrated and timely support to the warfighter.
(d) Integrating and coordinating information operations which include computer network attack and defense, electronic warfare, operational security, military psychological operations, and military deception.
(e) Space support procedures and infrastructure for tasking, posting, processing, and utilization (TPPU) of space products and telemetry, tracking, and command of space systems.
(f) Limitations and vulnerabilities of space systems to weather, interference, infrastructure failures, and attack.
(g) International law and treaties and U.S. policy.

115 Department of the Army, *Department of the Army, Pamphlet 600-3: Commissioned Officer Development and Career Management*, (Washington, D.C.: U.S. Government Printing Office, 2004), 42-1.

(h) Familiarity with United States civil and military space programs as well as those of other nations.
(i) Commercial space operations, activities and capabilities.
(j) Procedures for development and integration of policy, concepts, requirements, and acquisition for space capabilities.
(k) Use of modeling, simulation, analysis, and other tools to support development and use of space capabilities.[116]

The principal educational tool for equipping the FA40 officers with expertise in these areas is the Space Operations Officer Qualification Course (SOOQC). SMDC began conducting the SOOQC in 2001 and it was initially an eight week course. SOOQC is conducted an average of twice a year in Colorado Springs. The SOOQC increased in duration and is now an eleven week course. The SOOQC classes have included officers from every Service branch and have also included Space officers from the National Guard and Reserve. The Army has sent officers of every rank from Captain to Brigadier General as well as non-commissioned officers working in space positions.

With the establishment of the FA40 career path, the Army made a commitment to man the current and Objective Force with space-knowledgeable officers and to ensure that these officers have a career path that keeps them competitive for promotion. The ongoing challenge with respect to personnel issues is placing the low-density FA40 officer pool in positions benefiting not only the warfighter, but enabling the increased capability and performance of the Army space community. Increasing billet requirements for FA40s in the emerging Objective Force structure requires an increased number of FA40s in the Army. This will be a very difficult task to accomplish as one of the primary tenets of the Objective Force is for smaller-sized forces, not increased personnel strength of headquarters staff elements.

C. THE ARMY SPACE CADRE

In January 2001, the Commission to Assess United States National Security Space Management and Organization released their final report. The Honorable Donald Rumsfeld chaired the commission. Commission members were appointed by the

116 Department of the Army, *Department of the Army, Pamphlet 600-3: Commissioned Officer Development and Career Management*, (Washington, D.C.: U.S. Government Printing Office, 2004), 42-1, 2.

Chairman of the Committee on Armed Services (CAS) of the United States House of Representatives, the Chairman of the CAS of the United States Senate, the ranking minority members of the CAS of the House and Senate, and the Secretary of Defense. Members of the Commission included retired general officers from the Army, Navy and Air Force with space expertise, retired Congressmen, and leading figures in the government and private sector that possess in-depth and unique expertise in space operations. The National Defense Authorization Act for Fiscal Year 2000 authorized the Commission's activities and mandated their final report.

The Commission's charter was to assess the organization and management of space activities that support U.S. national security interests."[117] The 1996 National Space Policy was the document that identified space functions and missions that were assessed by the Commission. The Commission focused on DoD and Intelligence Community space actions, but also looked at commercial and civil space activities as well.[118]

The Commission report identified the United States interests in space. Those interests are:

> Promote the peaceful use of space.
> Use the nation's potential in space to support U.S. domestic, economic, diplomatic and national security objectives.
> Develop and deploy the means to deter and defend against hostile acts directed at U.S. space assets and against the uses of space hostile to U.S. interests.[119]

From the reports established interests in space, the Commission identified five tasks the government must execute to advance those interests. The tasks required to achieve the U.S. space interests are:

> Transform U.S. military capabilities.
> Strengthen U.S. intelligence capabilities.

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117 Commission to Assess the United States National Security Space Management and Organization, *Executive Summary: Report of the Commission to Assess the United States National Security Space Management and Organization*, (Washington D.C.: US Government Printing Office, 2001), 2.

118 Ibid., 2-5.

119 Commission to Assess the United States National Security Space Management and Organization. *FinalReport: Report of the Commission to Assess the United States National Security Space Management and Organization*, (Washington D.C.: US Government Printing Office), 27.

> Shape the international legal and regulatory environment that affects activities in space
> Advance U.S. technological leadership related to space operations.
> Create and sustain a cadre of space professionals.[120]

This section focuses on the fifth task identified above – creating and sustaining a Space Cadre. The Army Space community believes that to create a highly skilled Space Cadre, the DoD and the Army have to increase investments in career development, education, and training of space professionals to achieve and maintain a necessary level of competent military and civilian space experts.

> Military space professionals will have to master highly complex technology; develop new doctrine and concepts of operation for space launch, offensive and defensive space operations, power projection in, from and through space and other military uses of space; and operate some of the most complex systems ever built and deployed.[121]

The Space Commission identified three essential areas necessary for developing a highly competent military and civilian space cadre. These three areas are development of a military space culture, a professional military space education, and a science and engineering workforce. Key factors identified by the Space Commission developing a military space culture are senior leadership, enhanced space career paths, formal education processes, and longer duration space tours.[122]

D. SPACE FORCE MANAGEMENT AND ANALYSIS REVIEW (FORMAL)

The fifth task, to create and sustain a cadre of space professionals, is the impetus for SMDC conducting a Force Management and Analysis Review (FORMAL) of Army space activities. The Army Space FORMAL is directly linked to the findings and conclusions put forward in the Space Commission's Final Report. The Final Report

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120 Commission to Assess the United States National Security Space Management and Organization. *Final Report: Report of the Commission to Assess the United States National Security Space Management and Organization*, (Washington D.C.: US Government Printing Office), 27.

121 Ibid., 42.

122 Ibid., 42-47.

resulted in Congressional, DoD and Secretary of Defense directives that instructed all services to develop a Space Cadre Strategy. SMDC is the lead for developing the Space Cadre Strategy and chose the FORMAL process in 2004 to assess the mission area.

> In order to comply with Department of Defense direction, the Army has decided to use the Force Management and Analysis Review (FORMAL) process to establish and maintain a professional space cadre. The FORMAL process was selected for several reasons. First, as the capstone force management tool, the FORMAL review provides intensive management forums to facilitate Army-wide integration of all activities required to produce and sustain mission capable units to perform Army missions. Second, the FORMAL allows senior Army leaders to resolve issues affecting execution of programs and initiatives within the Space Cadre. Finally, it provides a valuable forum for horizontal and vertical integration within the Army.[123]

SMDC began the FORMAL process not solely to meet DoD and Congressional guidance. The FORMAL also has potential benefits for the transforming Army. The Army did not have a way to identify, track and develop the diverse capabilities of their military and civilian work force that can fill Joint, DoD and Service space billets. The Space FORMAL provides an initial course of action to track and train this workforce.

As the largest user of space products and services, the Army needs to maximize its use of their space experts to ensure maximum input into future space products and system development. Shrewd placement of space cadre in requirements development at Joint and Service level are critical if Army interests are to be captured and embedded in space systems development. The Space FORMAL provides an initial framework to manage placement of space cadre officers once they are identified and tracked.

The Space FORMAL could potentially result in increased funding of Army space activities. The Space FORMAL provides an overview of the Army's Space Cadre as mandated by Congress and DoD. Compliance in this area may result in additional resources to fund Service-specific space activities.[124]

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123 Dodgen, Larry, *Statement Before the Committee on Armed Services Strategic Forces Subcommittee, United States House of Representatives: Second Session, 108th* Congress, (Washington, D.C.: US Government Printing Office, 2004), 4-5.

124 Powers, Michael. *Army Space Cadre Force Management Analysis (FORMAL) Update Brief to the FA Conferenc*e, (Washington, D.C: 2005), 4.

The Space FORMAL process has four phases. The phases are:

Phase I will establish an Army-unique definition for the Army Space Cadre for use in the remaining three phases.

Phase II is a vertical analysis of all Army structure conducted by all elements of the Army to identify roles, missions, organizations, functions and personnel based on the approved Phase I Space Cadre definition.

Phase III is a functional review which reviews and develops, comprehensive Department of the Army policies supporting the Army Space cadre within the eight life cycle functions (structure, acquisition, individual training and education, distribution, deployment, sustainment, professional development, and separation).

Phase IV is a comprehensive analysis of the doctrine, organization, training, materiel, leadership & education, personnel, and facilities (DOTMLPF) domains to develop the final recommended Army Space Cadre Strategy.[125]

Initially the Army's Space Cadre will consist entirely of its FA40 Space Operations Officers. The FA40s are to be the Core Army Space Cadre or Space Professionals. The Space Professional category could also contain military (non-FA40) and civilian career space personnel. To comply with the DoD and Congressional mandates stemming from the Space Commission final report, Department of the Army Civilians (DACs) and other military personnel will be added to the Cadre. The Space FORMAL recommendation is DACs, warrant officers and enlisted personnel not become part of the Space Professional category unless the Army establishes a similar space career field for them as exists for the FA40s.

The FORMAL process also identified two additional personnel resource pools that could augment the Space Professionals as Space Cadre members. Space Enabler and Space Support are two other resource pool categories along with Space Professionals that could constitute the Space Cadre.

Space Enablers are military and civilian personnel who are not in the Space Career Field but who require space training to work in their duty position. They enable space operations because of their job's assigned duties; however, they are not FA40

125 Royston, Ken. "The Army Space Cadre FORMAL," *The Army Space Journal*, Fall 2004, 25, 50.

Space Operation Officers. They are currently not part of the Core Space Cadre. An example of this category would be an Army Signal officer working in the 1st Satellite Control Battalion. Their assignments are not tracked and managed by the FA40 Career Field.

The Space Support category is comprised of all personnel assigned to space organizations and support day to day activities. They would not require specific space training to perform their job but are organic assets to the space unit such as medical, logistic or finance personnel. They are not part of the space career field nor are their career path tracked and managed by the FA40 assignment officer.

Adding either the Space Enabler or Space Support personnel pool, or both, to the Space Cadre will meet the Commission's guidance to include DACs and other military personnel. The inherent problem with inclusion of DACs or non-FA40 officers in the Space Cadre is that there is no single control point within the Department of the Army to track and manage career progression.

That is the purpose of Phase I and Phase II of the FORMAL process. Define the criteria for being a member of the Space Cadre and then identify those personnel, organizations, skills and positions that meet the Phase I definition of a Space Cadre member.

The Army embedded the guidance from the Space Commission in the latest revision of DA PAM 600-3, discussed in the first section of this chapter. The FA40 personnel pool is identified as the core of the Army's Space Cadre in compliance with Commission and Congressional guidance. "FA40s are the core of the Army's Space Cadre, a key element of DoD's Space Cadre. The Space Cadre was created per the 2001 DoD Commission to Assess US National Security Space Management and Organization."[126]

126 Department of the Army, *Department of the Army, Pamphlet 600-3: Commissioned Officer Development and Career Management*, (Washington, D.C.: U.S. Government Printing Office, 2004), 42-9.

A critical aspect of Phase III of the FORMAL process is identifying the personnel issues and problems associated with training, tracking, assigning and educating a Space Cadre. Currently, the FA Proponent Office and the FA40 Assignment Officer are the caretakers of the Space Cadre because the FA40s are the only resource pool from which the Cadre is drawn. If DACs and other military officers, warrant officers and soldiers become part of the Space Cadre the complexity of tracking, training, assigning and educating this diverse, large number of personnel becomes very complex. It is made even more problematic if these DACs and additional military members are not in a dedicated space career field. Phase III of the Space FORMAL will develop DA policies that will support the Army's Space Cadre across the eight life cycle functions.

An example of this problem is a communications NCO assigned to an ARSST team or a Military Intelligence Officer assigned to a Commercial Exploitation Team. If they are not in a space career field, their parent branch is responsible for training, tracking, assigning and educating them to ensure they remain competitive for promotion. Those responsibilities will at some point in time conflict with their space missions. Eventually, such personnel will have to return to parent branch assignments after developing valuable space expertise. Such a situation does not serve the best interests of those individuals, the Space Cadre or the Army. Having a very small number of FA40 space experts does not necessarily serve the Army's best interests either. Expanding the FA40 ranks however will be very contentious. The recommendation of the FORMAL is to include only those personnel who are in the space career field. Optimizing space expertise and manpower cannot be adequately performed if Space Cadre members are continually rotating through the mission area.

The final phase of the FORMAL process, Phase IV is to assess the strengths and weaknesses of the Space DOTMLFP (Doctrine, Organization, Training, Materiel, Leadership and Education, Facilities, and Personnel) and develop the Army Space Cadre Strategy. The Army Space Cadre Strategy will provide the road map for a space force

that optimizes its benefit to the Transformed Army. The final product from Phase IV is the Army Space Cadre Strategy. The Vice Chief of Staff, Army will decide what courses of action will be implemented to execute the Space Cadre Strategy. [127]

The FORMAL will benefit the Army Space community by providing resources in the 2008-2013 Program Objective Memorandum (POM) and establishing priorities and necessary actions to achieve long-term goals through the Space Cadre Strategy. The Army benefits from the Space FORMAL because a group of space experts is identified, managed, and tracked in order to leverage their capabilities for warfighter support. The Army Space Cadre Strategy will be published in October 2005.

E. MANNING REQUIREMENTS IN ARMY SPACE

The Army's FA40 proponent has separated the manning requirements into three categories. The space personnel manning requirements categories are consistent with the Joint/Service levels of command. The three categories are Strategic and Joint, Operational and Service, and Tactical.[128] The examples of personnel assignment locations shown in Figure 30 are not all inclusive to their respective levels. It is important to note that the Corps space support positions are shown in Figure 30 as "Tactical" billets. Corps/UEy headquarters can execute tactical level combat operations but most likely will conduct operational-level missions. UEy headquarters can execute across both levels. This chapter's material addressing Corps/UEy manning is consistent with Figure 30 and appears in the section on tactical-level manning.

127 Royston, Ken. "The Army Space Cadre FORMAL," *The Army Space Journal*, Fall 2004, 25.

128 U. S. Army Space and Missile Defense Command FA40 Proponent Office, *FA40 NPS Orientation Brief*, (Washington, D.C.: 2005), 7.

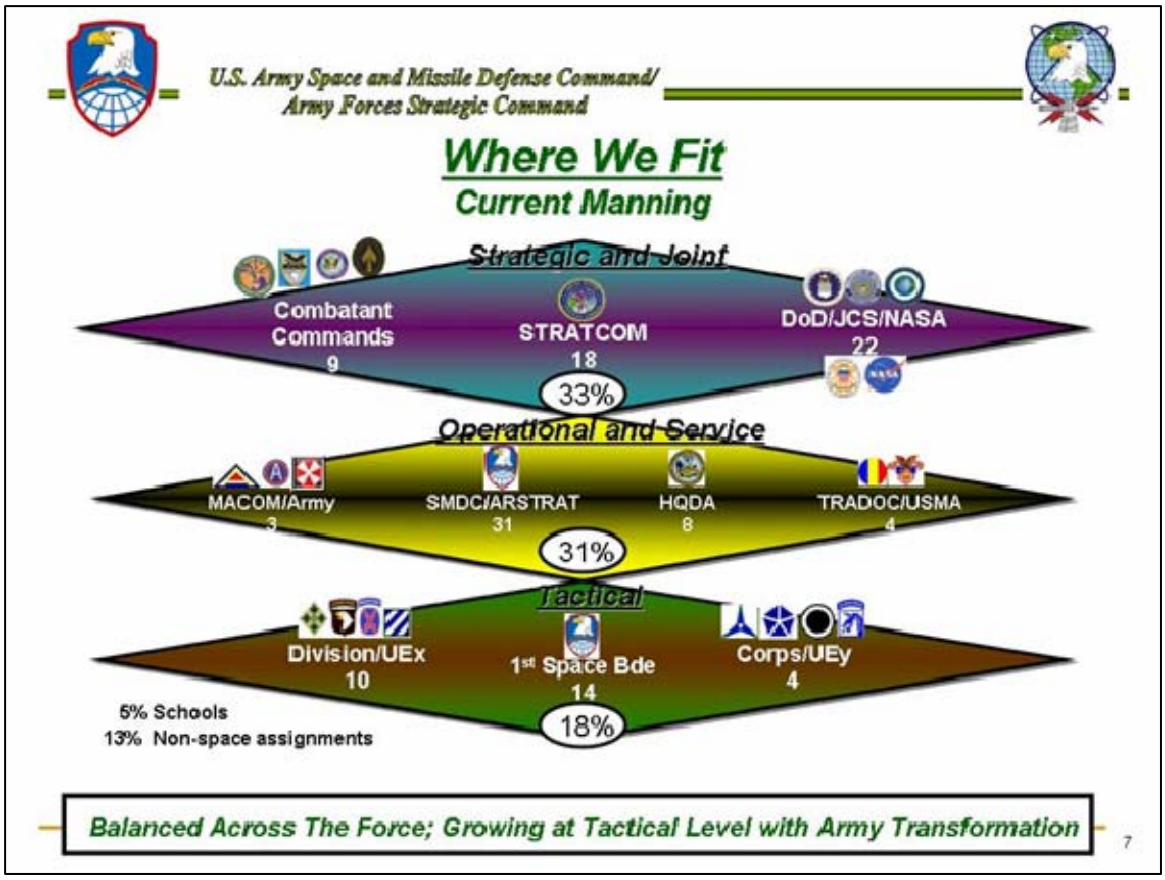

Figure 30. FA40 Personnel Manning Levels[129]

1. Tactical Manning

At the tactical level of Division/UEx and below, FA40s will provide support with several elements. The lowest echelon be supported by FA40s is the Brigade/UA. FA40s may be assigned to the Fires and RSTA Brigades in each of the ten active Divisions/UEx. The highest tactical level supported is the UEx or possibly a Corps/UEy headquarters.

The preponderance of tactical level space support comes from the UEx SSEs at two-star command or Division levels. The UEx SSE as discussed in Chapter IV called for a six-man element in the original Force Design Update. Table 7 shows the manning requirements for the SSE that was originally established in the Force Design Update and later reduced by the Chief of Staff, Army to one Lieutenant Colonel and one Major. The final decision on the SSE force structure is still under review.

129 U. S. Army Space and Missile Defense Command FA40 Proponent Office, *FA40 NPS Orientation Brief*, (Washington, D.C.: 2005), 7.

The FA40 manning requirement at Corps level, a three-star UEy headquarters, is currently one FA40 Major. The three-star UEy command levels manned by FA40 Space Operations Officers are I, III, V, and XVIII Corps.[130]

Army Space Support Team	Space Support Element (UEx)
ARSST Leader – Major (FA40)	SSE Chief – Lieutenant Colonel (FA40)
ARSST Officer - CPT (non-FA40)	SSE Officer – Major (FA40)
Intelligence NCO - Staff Sergeant (E6)	SSE Officer – Major (FA40)
SATCOM NCO - Sergeant (E-5)	SSE Officer – Major (FA40)
Topographical NCO - Sergeant (E-5)	SSE NCO – Staff Sergeant (E6)
Info Systems Specialist - Specialist (E-4)	SSE NCO – Staff Sergeant (E6)

Table 7. ARSST and SSE Manning[131]

2. Operational and Service Level

Because the transformed UEy construct is still in the concept phase, the space support personnel plan to support the UEy is not finalized. SMDC's combat and force developers have considered an organic SSE at UEy level. These UEy SSEs could be organic to Corps, Army, or Army Service Component Command-levels. The number of proposed FA40s per space element at the Brigade/UA and UEy level is shown Table 8. If FA40s are emplaced at the UA level and at the various levels of UEy headquarters, there would be a strong argument to increase the number of available FA40s.

Proposed Fires Brigade (10 Brigades)	Proposed RSTA Brigade (10 Brigades)	Proposed UEy SSE (Corps/ASCC/Army)	Current Corps Support (4 Corps)
FA40 Major	FA40 Major	FA40 Colonel	FA40 Major
	FA40 Major	FA40 Lieutenant Colonel	
	Commo NCO	FA40 Major	

Table 8. FA40 Manning at Brigade and UEy Levels[132]

Operational level manning by FA40s is primarily at SMDC/ARSTRAT and Headquarters, Department of the Army. There are currently no organic SSE-like

130 U. S. Army Space and Missile Defense Command FA40 Proponent Office, *FA40 NPS Orientation Brief*, (Washington, D.C.: 2005), 19.

131 Story, Kurt, Army Theater Space Support in Joint Operations Brief, (Colorado Springs, CO.:2005), 25.

132 U. S. Army Space and Missile Defense Command FA40 Proponent Office, *FA40 NPS Orientation Brief*, (Washington, D.C.: 2005), 29.

elements at this level. If a Corps or EAC need space support to augment the FA40 Major who is on the Corps staff, an ARSST team would most likely be deployed to augment that headquarters.

The ARSSTs generally support a Corps or an Echelon-above-Corps UEy when deployed. The ARSST manning requirements are very similar to the originally proposed, objective UEx SSEs. The ARSST is manned by a total of six soldiers under the leadership of an FA40 Major. ARSST manning is the same as the UEx SSE except there are only two officers and the senior member of the ARSST is a Major compared to the rank heavier SSE which has a Lieutenant Colonel and two Majors. The SSE is officer heavy to facilitate manning three Command Posts. Table 7 shows the SSE in comparison with the 1st Space Battalion's ARSSTs.

3. Strategic and Joint Level

Strategic and Joint level manning occurs at Combatant Commands and in such departments as the Joint Chiefs of Staff and DoD. Each Combatant Command has an Army Service Component Command headquarters assigned to provide support. The SSEs could also be organic to the Army Component supporting the warfighting Combatant Commands. They would be another level of the UEy SSE. The UEy SSEs at the Army Component Command level could provide organic support to Northern Command (NORTHCOM), Central Command (CENTCOM), Pacific Command (PACOM), Southern Command (SOUTHCOM) and European Command (EUCOM). The UEy SSE manning proposal consists of a Colonel, Lieutenant Colonel and a Major.[133] In comparison with the UEx SSE, the UEy SSE will have fewer people, as they will support a single command post, but have a higher rank structure to interact with their Joint and Service staff counterparts.

A robust Army space operations element is also located at STRATCOM. Determining the proper manning requirements for the Joint Space Operations Center at Vandenberg AFB will be a crucial task for SMDC. Solidifying roles and responsibilities

133 Driscoll, Jerome, *FA40 Conference Update Brief*, (Alexandria, VA: 2005), 42.

of these space operations elements and support cells for other Combatant Commands is still ongoing and will have a significant impact on the ability to man the three personnel levels with FA40s.

4. Balancing the Manning Requirements

The challenge in distributing the FA40s throughout the three manning categories is a complicated issue made even more difficult by Army Transformation and the efforts to embed organic space forces in tactical units. In February 2005, the distribution of the Army's roughly 150 Space Operations Officers was 33% in Strategic and Joint positions, 31% in Operational and Service positions, 18% in Tactical positions and 18% in schools and non-space positions.[134]

It is fairly obvious that having the same percentage of FA40s in tactical assignments, as are in school and in non-space billets, is not an optimal distribution of personnel. The Army's shift in focus to recreating Legacy Divisions into Modular Divisions and Brigades resulted in significant changes in FA40 positions and manning. There is much uncertainty in the final SSE force structure that will be organic to the UEx. Final approvals by the CSA on the UEx SSE as well as FA40s at UEy, Corps and Brigade levels are pending. These decisions will take several years to resolve. SMDC has made manning the ten UEx/Division SSEs the top priority. Filling the Brigade, Corps and UEy SSE positions with FA40s will follow the UEx SSE priority.

The greatest challenge in the personnel arena is creating more than current 150 FA40 positions in the Army. With the rapidly expanding demand for space operations officers in the UEx SSE, UEy and Fires/RSTA Brigades, the distribution of FA40s in the Tactical category could reach as high as 65% of the personnel pool. Such an imbalance would not serve the Army's best interests in the Strategic/Joint and Operational/Service categories. If Joint and Service space billets are not manned, eventually a lack of Army representation in these forums will result in an absence of Army-centric requirements, concerns and issues. Eventually, weak or no representation at the Joint and Service level will adversely impact the performance of FA40s to provide support in the tactical billets.

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134 U. S. Army Space and Missile Defense Command FA40 Proponent Office, *FA40 NPS Orientation Brief*, (Washington, D.C.: 2005), 7.

The best solution from a space perspective is to "grow the career field" and add FA40 billets to the current strength of approximately 150. Doubling the number of FA40s is not inappropriate if tactical level manning continues to expand. As touched on in an earlier chapter, such growth in personnel at headquarter staffs is completely opposite to Army Transformation principles. Equally problematic is that any increase in FA40 strength will almost assuredly result in equal decreases to the Army's signal and military intelligence billets. This zero-sum situation will draw strong opposition from those communities, both of whom hold principal staff directorates on the Department of Army (DA) Staff. The space community does not have an equal directorate position on the DA Staff.

It is highly unlikely that the FA40 community will grow significantly in strength over the remainder of this decade. The critical personnel decisions will ultimately be made by SMDC/ARSTRAT concerning suitable distribution of the limited number of FA40s across the three manning categories. The Space Cadre Strategy will incorporate suitable analysis of the manning level tradeoffs and provide a roadmap for the FA40 career field. However, the ultimate long-term success of the FA40s rests with the Army Space community's ability to increase their authorized personnel strength.

VI. EQUIPPING THE SPACE FORCE

A. OVERVIEW

The equipment used by the SSE and the ARSST are very similar and provides global communications reachback, increased bandwidth, and space products and services to their supported units. Chapter VI provides a brief description of the equipment sets for the ARSST and SSE.

The 1st Space Battalion has several one-of-a-kind, DoD-unique equipment packages within their assigned companies. A brief outline is given of the equipment used by 1st Battalion subordinate units to perform their mission statements presented in Chapter II. What do they use to execute their missions? This chapter will not provide in-depth analysis of the equipment performance and specifications. It is intended to provide an overview of what Army space elements are using to complete their tasks.

The foundation of any Army piece of equipment is a Service or Joint requirements document. The Army space requirements documentation have not been written and approved to equip existing space force structure to perform their mission. Without valid requirements documents, there is no vehicle to equip Army space forces within the DoD materiel acquisition framework. The absence of necessary requirements documents will be highlighted.

B. ARMY SPACE REQUIREMENTS DEVELOPMENT

The responsibility for requirements development for Army space belongs to the Director of Combat Developments in SMDC. The Combat Developments Directorate is part of the Future Warfare Center in Colorado Springs. The requirements development process has experienced significant changes the last several years as part of a massive effort across DoD to streamline the acquisition process. All of the Army and Joint requirements guidelines and processes were updated in 2003 and 2004.

The biggest changes were the emergence of the Initial Capabilities Document (ICD), Capabilities Development Document (CDD) and the Capabilities Production

Document (CPD). Chairman of the Joint Chiefs of Staff Manual (CJCSM) 3170.01A, Operation of the Joint Capabilities and Integration Development System (JCIDS), defines the requirements development process for DoD.

In earlier versions of CJCSM 3170.01A different documents were used in the requirements development process. The new ICD replaces the previously used Mission Need Statement (MNS). Both documents addressed the same requirements topic. "The ICD documents the JCIDS analyses that describe a capability gap and explains why a recommended materiel approach is most appropriate."[135] Both the MNS and the ICD identify a warfighting capability that is needed and explains why the materiel solution is required. The ICD defines the concept and sets the foundation for technology development. The Joint Requirements Oversight Council (JROC) must approve an ICD before it can proceed to a Milestone A (MS A) decision.

Milestone Decision Authority (MDA) is held by the Air Force for Joint space systems. The Army's Program Executive Office – Space (PEO-Space) has MDA for Army-centric space systems. A large amount of analyses, concept and architecture development, and functional area analysis must be done to support the ICD in order to reach a Milestone A decision. Milestone A signals the start of a Technology Development Strategy to support the warfighting concept.[136]

The MS A decision is the validation of the Concept Refinement phase and the gateway for initiating the Technology Development phase. At the end of the Concept Refinement and Technology Development phases a materiel solution should be the evident solution to satisfy an approved warfighting requirement. However, a materiel solution for a mission need is not always the outcome. There is considerable analysis conducted that will determine if a materiel solution is in fact needed. An Analysis of Alternatives (AoA) may find a materiel solution is not necessary and the identified mission need can be satisfied through other measures, such as changes in training or

135 Department of Defense, Chairman *of the Joint Chiefs of Staff Manual 3170.01A: Operation of the Joint Capabilities Integration and Development System*, (Washington, D.C.: US Government Printing Office, 2004), D-2.

136 Department of Defense, *Department of Defense Instruction 5000.2: Operation of the Defense Acquisition System*, (Washington, D.C.: US Government Printing Office, 2003), 3.

doctrine. The requirement and initial concept of the materiel solution should be framed in an existing or emerging architecture. The ICD is the vehicle that establishes the warfighting requirement and replaces the Mission Need Statement.

With an approved ICD, a draft Capabilities Development Document (CDD), and a Technology Development Strategy, a Milestone B decision is made by the MDA. An MS B is the official start of a DoD acquisition program. The System Development and Demonstration (SDD) acquisition phase can begin after an MS B decision. In the SDD phase, the requirements developers draft a Capabilities Production Document (CPD). The technology developers and acquisition personnel demonstrate the needed technology for the system. A prototype is built showing that the needed technology can be incorporated into a suitable system that meets the warfighting requirements established by the ICD and CDD.

After the SDD phase, a system CPD is approved by the JROC and a Milestone C decision is made by the MDA. The MS C begins the Production and Deployment phase during which initial production and operational testing occur. After operational testing a Final Design Review is conducted prior to Full Rate Production. The requirements developers are continually involved in demonstration and testing to ensure the system delivers the needed warfighting capability.[137]

The requirements developers in the SMDC Future Warfare Center are the key personnel in establishing the ICD, CDD and CPD for Army space systems. The CDD and CPD replace the Operational Requirements Document (ORD) in the updated requirements process. Until MS B and establishing of a Program Office, the requirements developers are the driving force behind the early stages of the acquisition process. After the program office is established, the requirements developers are the direct link from the technology development, prototype demonstration, system operational testing and the warfighter requirements and capability gaps. A robust space

137 Department of Defense, *Department of Defense Instruction 5000.2: Operation of the Defense Acquisition System*, (Washington, D.C.: US Government Printing Office, 2003), 3.

requirements development section is critical to the acquisition process for any Army space system, and equally important if Army requirements are needed in Joint space systems.

The Army Space Policy clearly states the Army will pursue space capabilities and systems. Space has evolved into a Joint mission area and this Joint nature is accepted by all of the Services. The Army understands the Air Force will be the lead Service on almost all new satellite systems. The key for the Army as the largest user of space is to have space expertise in the form of FA40s in the requirements development offices at Joint and Air Force levels. The only chance the Army has of optimizing the use of new satellite systems is to embed Army-specific needs in the Joint and Air Force space requirements process.

The Joint nature and extremely high cost of new space-based systems, as well as a ground-based space control capability, make it very unlikely the Army will ever acquire a Service-specific system. Until 2004, the only approved Army space systems requirements document was for a Kinetic Energy Anti-Satellite (KE ASAT) system. This requirements document is almost 20 years old and the KE ASAT project was abandoned and mothballed in the '90's.

There have been recent Army ICDs developed for a tactical, ground-based capability to counter threat imagery and communications satellites. An Army ICD has also been developed by SMDC to establish a warfighting requirement to conduct surveillance of satellites with a ground-based system. The concept is to have in-theater, tactical, ground-based targeting and engagement capabilities to counter threat satellites. This sensor-to-shooter pairing would provide a counter-satellite communications and counter-satellite imagery capability. The Army intent to acquire such a Space Control System capability is openly stated in the Army Space Policy. The Army has one validated ICD for a counter-satellite communications capability and has a counter-satellite imagery ICD that will soon be reviewed by the Department of the Army for approval. These requirements documents have not been approved by the JROC. They have only received Army Requirements Oversight Council review. A satellite surveillance ICD is currently being staffed for Army review and approval.

Discussion of the actual technology means to enable such capabilities and the specific target set quickly enters the Secret and Top Secret security classifications. For this reason, in depth assessment of these ICD enabling technologies and the target sets is beyond the scope of this paper.

The problem for the Army is taking a Service-centric approach to developing requirements documents for a Space Control and Space Surveillance capability. Space Control and Space Surveillance are Joint mission areas. Development of requirements documents in a Service, not Joint, manner is not likely to succeed. The Air Force is the Executive Agent for space within DoD and is also the MDA for DoD space systems. It is highly unlikely that such a capability will ever be acquired without the Air Force as the lead Service. Ground-based, tactical systems with such a capability may arguably be the sole domain of the Army, but developing and acquiring such sensors and engagement capabilities is a Joint domain. The Air Force is unquestionably the DoD lead for this domain.

The Army does not have sufficient funding or manpower to pursue development of Army-centric space requirements and capabilities; it must be done in a Joint environment. Because space control missions have approval authority at the President and Secretary of Defense levels - Battle Management, Command, Control, Communications, Computers and Intelligence (BMC4I) systems are also Joint in nature. Developing a Space Control and Surveillance requirements document must be Joint solely from a communications architecture perspective. Future development of Army space requirements are important, but almost as important is accepting the reality that such development must be done through a Joint Program Office, and most likely with the Air Force as the lead agency.

C. CURRENT EQUIPMENT FOR ARMY SPACE FORCES

The primary piece of equipment for the SSEs and the ARSSTs is the Space Support Element Toolset version 2 (SSETv2). SSETv2 is mounted on a Highly Mobile Multi-Purpose Wheeled Vehicle (HMMWV) with a rigid wall shelter. The SSET is composed of a Space Applications Technology Utility Reachback Node (SATURN) communications suite and four Space Operations Systems (SOS).

The SATURN communications suite is a Commercial-Off-the-Shelf (COTS) system. The SATURN suite has Internet Protocol Satellite (IPSAT), International Maritime Satellite (INMARSAT) and Iridium cell phone capability. The communications capability and additional bandwidth that comes with a SATURN suite is highly valued by the elements supported by the SSE or ARSST.

The Space Operating system (SOS) is a computer workstation that enables space analysis, imagery manipulation such as 3D fly throughs, common operational picture (COP) and situational awareness (SA) in support of tactical operations. Space analysis is done through the use of Space and Missile Analysis Tool (SMAT), Space Battle Management Core System (SBMCS), and Satellite Tool Kit (STK) software on the SOS. COP and SA are enabled by use of Advanced Warfighting Environment (AwarE), Intelligence Situational Awareness Tool (ISAT), Command and Control Personal Computer (C2PC) software. Imagery manipulation is enabled by the use of PC Datamaster, Falcon View, Sky View, Bird Dog, ERDAS Imagine and Electronic Light Table (ELT) 3500 software.

There are two complete SSETv2 sets planned for each SSE. The SSETv2 sets are mounted on the rigid wall shelter HMMWVs. The SSETs will operate in the UEx TAC CP1 and TAC CP2. One of the SSETv2 SOS workstations is a mobile system that will be dismounted and used in the Main CP. An SSE will have two SATURN communications suites and eight total SOS workstations. The SSE's toolset is transported on two HMMWVs. The ARSST is only equipped with one of the SSETv2 HMMWV systems.

The only major difference in the ARSST and the SSE in equipment is that the ARSTT has one vice two HMMWV mounted SSETs and the ARSSTs do not have an additional COTS upgrade. The COTS upgrade includes a tactical server, a multifunction printer, an improved encryption device, a 1-terabyte NAS drive, dual monitors, and a 36-inch plotter. Both the ARSST and SSE toolsets enable critical reachback capability to the SMDC Operations Center in Colorado Springs.[138]

138 United States Army Space and Missile Defense Command, "Army Space Support Team – Tactical Set (Dismounted) Fact Sheet," par. 2 [government website] (14 July 2005 [cited 27 July 2005]); available from World Wide Web @ http://www.smdc.army.mil/FactSheets/ARSST.pdf

The Commercial Exploitation Team (CET) in the 1st Space Brigade is equipped with the Eagle Vision II mobile suite. The Eagle Vision II van enables the CET to receive direct downlink from the SPOT 2, SPOT 4, Radarsat, Quickbird and IKONOS commercial imagery satellites. Specific satellites are dependent upon direct contracting with individual companies. The CET can receive and disseminate imagery of less than one-meter resolution within hours. There are only two Eagle Vision suites in the Army and both belong to the 1st Space Battalion's CET Company.

The JTAGS Company is equipped with six of the Joint Tactical Ground Stations. A JTAGS section's equipment consists of a JTAGS Shelter with M1022A1 Mobilizer, three satellite dish antennas, two 5-ton trucks, a 60kw generator and a HMMWV with trailer. The JTAGS system is the key part of the Theater Event System (TES). JTAGS receives direct downlink data from up to three Defense Support Program (DSP) satellites. The DSP data are then disseminated in theater to provide missile warning of incoming tactical ballistic missiles. The JTAGS missile warning data is transmitted on existing TRAP Data Dissemination System (TDDS), Tactical Information Broadcast Service (TIBS), and the Joint Tactical Distribution System (JTIDS) communications networks. Future upgrades will enable JTAGS to receive sensor data from the Spaced-Based Infrared System (SBIRS) that will replace the DSP constellation.[139] The JTAGS detachment deploys with two sections of equipment.

139 Global Security Corporation, "JTAGS – Joint tactical Ground Station," par. 6, [commercial website], (27 April 2005 [cited 23 July 2005]), available from World Wide Web @ www.globalsecurity.org/space/systems/jtags

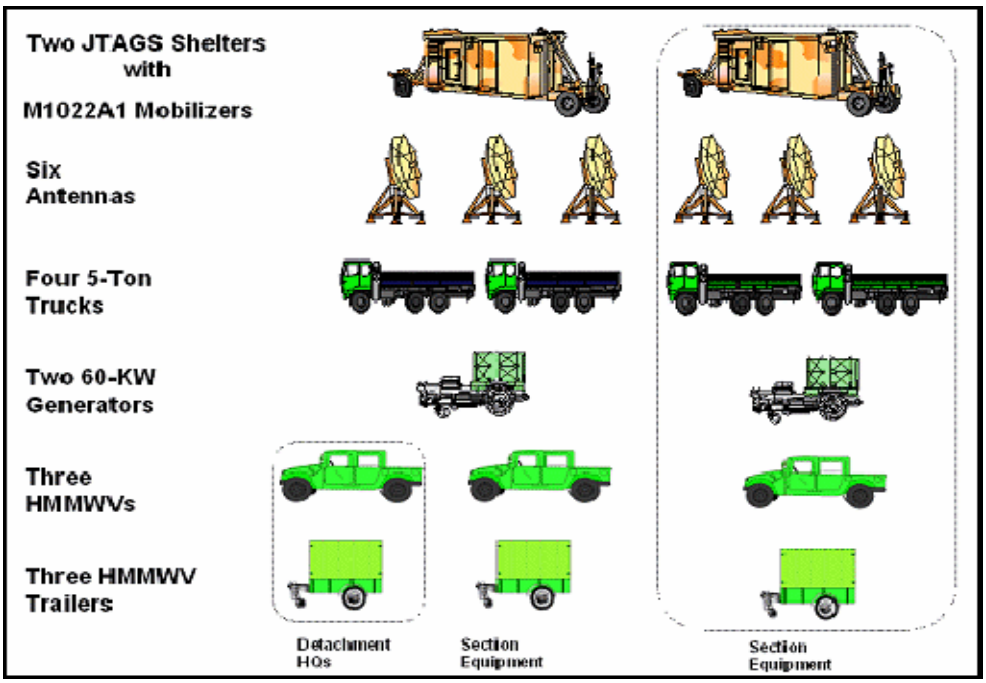

Figure 31. JTAGS Detachment Equipment[140]

The Space Control Company is currently equipped with one Space Control Electronic Warfare Detachment (SEWD). The SEWD is made up of "three expandable tactical vans (one for mission planning, one for command and control and one for the electronic warfare suite), generators, and the requisite antennas for the mission. The ground suite is deployable by C-17 or C-5."[141] The current SEWD is composed of test and evaluation (T&E) equipment. This equipment is not supported by a Force Design Update or an approved requirements document.

The Space Control Company in 1st Space Battalion is the most glaring shortcoming with respect to equipping Army Space Forces. The equipment consists entirely of T&E materiel and requires heavy contractor support. This is clearly an equipment issue that must be addressed in several areas. There must be a Joint or Army requirements document that formalizes and approves the need for such an equipment set. As T&E equipment it does not receive operation and maintenance funding from the

140 Global Security Corporation, "JTAGS – Joint tactical Ground Station," par. 12.

141 Netherland, Scott, "Space Control and Electronic Warfare Detachment," in Army Space Journal, par. 5 [online magazine] (2001 [cited 26 July 2005]); available on World Wide Web @ http://www.smdc-armyforces.army.mil/SpaceJournal/Article.asp?AID=23

Army. Any funding shortfalls that are not covered by T&E dollars must be met by SMDC's annual budget. Security is another issue that challenges the manning and fielding of this equipment set because much of the offensive space control technology and the target set are in compartmentalized Top Secret security classifications.

Space Control and Electronic Warfare are areas that quickly move into Secret and Top Secret classification realms when target sets and technologies are discussed. It is almost impossible to normalize the use of this equipment set if its targets and its means of affecting that target remain classified. It also complicates manning the equipment if all operators must have a Secret or Top Secret clearance. Fielding of such equipment requiring special manning and limited access to an operational unit such as 1st Space Battalion is not feasible and should be avoided.

D. FUTURE EQUIPMENT

Planned improvements to the Army space forces' equipment are limited outside of software and SATCOM receiver upgrades. The JTAGS shelters are in the process of being upgraded with the Multi-Mission Mobile Processor (M3P) that receives direct downlink sensor data from the SBIRS satellites.

There will be upgrades to the capability of the CET shelters to receive data from additional commercial imagery satellites. The SSE and ARSST space toolsets will also be improved with software upgrades and additional COTS requisitions enabling them to perform their mission sets more efficiently. New equipment that enables the ARSSTs, SSEs or other Space Battalion assets to do additional Space mission area tasks is not forthcoming. The absence of valid requirements documents is one of the major reasons.

The area of most concern will be equipping the Space Control Company. Joint and Service doctrine and policy identify Space Control as a function the Army will pursue. Establishing a Joint or Army-centric requirements document for tactical, ground-based surveillance and negation platforms will be the focus of materiel solution efforts in the area of Space Control. The Space Control Company has the mission, but not the equipment. As discussed earlier in this chapter, it is not likely such a requirement will be approved by a JROC if it is not a Joint requirement.

Another option is for the SEWD T&E equipment to be proven as an effective mobile, Information Operations (IO) platform by the Space Control Company. SMDC/ARSTRAT has the mission from STRATCOM to be the Service lead for Information Operations. SMDC could establish an operational requirement for an IO equipment suite to meet its mission responsibilities to STRATCOM. Jamming of communications satellites is a subset of the Space Control mission but a requirements document could also be developed under the umbrella of IO. This is an important distinction as the IO area is not the clear domain of the Air Force as is Space Control. The largest hurdle in equipping the Army Space forces is establishing valid operational requirements for a Space Control or IO system.

VII. SERVICE SPACE ORGANIZATIONS AND STRUCTURE

A. OVERVIEW

The Army's sister Services have unique approaches to organizing their space forces, unique space career paths and personnel management, and unique mission area focus. Chapter VII will look at the other Services and how they approach the space mission area.

The Army, Navy, Marines and Air Force space organizations and manpower are widely varied across the Services. The main factors driving the different approaches to organizing and manning the space forces are funding and available personnel. The Air Force commits more people and dollars to the space mission than the other Services combined, roughly 86% of the annual DoD budget for space.

Understanding the Services' and the Joint perspective on space is important because the space mission area is undeniably Joint in nature, but dominated by the Air Force. Awareness of the other Services' mission area focus and organizational construct are important to understanding the Joint Space mission area.

B. THE NAVY

The Navy approaches space operations in terms of how the space mission enables network operations. Navy space operations are the responsibility of the Naval Network Warfare Command (NETWARCOM). The mission statement of the NETWARCOM is:

> To act as the Navy's central operational authority for space, information technology requirement, network and information operations in support of naval forces afloat and ashore; to operate a secure and interoperable naval network that will enable effects-based operations and innovation; to coordinate and assess the Navy operational requirements for and use of network/command and control/information/technology/information operations and space; to serve as the operational forces' advocate in the development and fielding of information technology, information operations and space and to perform such other functions and tasks as may be directed by higher authority.[142]

142 Naval Network Warfare Command, "Naval Network Warfare Command," par. 2, [US Navy website], (cited 1 August 2005) ; available from World Wide Web @ https://ekm.netwarcom.navy.mil/netwarcom/nnwc-nipr/index.htm

NETWARCOM headquarters is in Norfolk, Virginia. The NETWARCOM commander was also the Commander of Naval Space Command and the Naval Component Commander to SPACECOM prior to its merger with STRATCOM. The NETWARCOM commander is a 3-star Admiral who has the Naval Network and Space Operations Command (NNSOC) at Dahlgren, Virginia as a subordinate unit. The merger of Naval Space Command and the Naval Network Operations Command formed NNSOC. NNSOC provides focus for the Navy's space requirements, operational management of space systems, operation of the Naval space surveillance network, tactical and operational space support, and backup capability to Cheyenne Mountain as the Alternate Space Control Center. Within the NNSOC is the Naval Satellite Operations Center (NSOC) at Point Mugu, California. NSOC conducts satellite telemetry, tracking and commanding and is "charged with maintaining the health and welfare of satellites that are critical to naval operations."[143]

The Navy completed a Space Cadre study as directed by the Space Commission Report of 2001. This is the same type of effort the Army conducted with their Space FORMAL process. The Navy's Space Cadre Human Capital Strategy identifies multiple areas of space within the DoD that must be engaged to ensure the Navy has an integrated space capability. "Space is an integral piece of the Naval Power 21 and FORCEnet that requires a highly integrated force capable of working in a joint and coalition environment, and going it alone when necessary."[144]

The Navy will distribute its Space Cadre across all sectors of DoD space so Naval requirements are reflected in future space system development and acquisition. The Navy does not have anywhere near the necessary manpower and money to spend on the Space mission, but will leverage the work and resources of the other Services by placing space experts in five space sectors. The Space Cadre Strategy defines these five functional areas of space as Assessment, Requirements, Science and

143 Naval Network and Space Operations Command, "Naval Network and Space Operations Command – Command Profile," par. 16, [US Navy website], (cited 1 August 2005) ; available from World Wide Web @ http://www.nnsoc.navy.mil/organization/cmdfacts2.htm

144 Department of the Navy. *Navy Space Cadre Human Capital Strategy*. (Washington, D.C.: US Government Printing Office, 2004), 1.

Technology/Research and Development, Acquisition, and Operations. With a proper dispersion of space experts, the Space Cadre can "leverage their operational experience and formal education to ensure space systems are tactically relevant to maritime missions."[145]

The Army and the Navy have very similar goals for their Space Cadres but unlike the Army and Air Force, the Navy does not have a dedicated Space career path. The Navy does not have an equivalent designator or career field like the Army's FA40. The Navy has 237 space billets as of October 2004, comparable to the Army's FA40 population of roughly 150 officers.[146] The Navy's Space Cadre move back and forth from assignments in the space mission area and their primary career paths. This continual migration is necessary to maintain the officers' promotion potential. This is the major difference from the Army's FA40s who will be promoted from the space operations career field.

C. THE MARINE CORPS

The Marines take a similar approach to the Navy in manning and organizing their space positions, but on a much smaller scale. Like the Navy, the Marines do not have a dedicated space career path. Marines work in space billets and then return to parent branches to remain competitive for promotion. The Marine activities in space are focused on reviewing requirements, policy, science and technology, operational plans, and doctrinal documents to ensure the Marine position and Service-unique requirements and concerns are reflected and integrated in these areas.

The Marine organization in charge of performing space activities is the Information Operations and Space Integration Branch (PLI). This organization is under the direction of a Marine Corps Colonel in Washington, D.C. As well as being the Marine Corps lead for IO and space coordination, the PLI mission is also to:

145 Department of the Navy. *Navy Space Cadre Human Capital Strategy*. (Washington, D.C.: US Government Printing Office, 2004), 3.

146 Ibid., 7.

> Provide the Director, Strategy and Plans, with assistance to formulate, recommend, and coordinate staff actions on Marine Corps roles, plans, and direction in IO and space operations.[147]

The Marine Corps requirement and concept for operational space support to warfighting is very similar to Army space operations. The Marines desire a tactical space support element capable of moving with ground tactical forces. The Navy abandoned their concept of tactical Naval Space Support Teams in the 90's, but the Marine Corps still believes there is a role for tactical space support. This similar support requirement is made evident by the space support provided to the 1st Marine Expeditionary Force (MEF) by an Army Space Support Team during Operation Iraqi Freedom. The Marine focus on the tactical support of the warfighter by space is evident in the distribution of their Space Cadre, of the Marines 111 space billets, 60 are at the tactical level.[148]

D. THE AIR FORCE

The Air Force manages all their space operations through the Air Force Space Command (AFSPC) at Peterson Air Force Base, Colorado. AFSPC is commanded by a 4-star general and has the 14th Air Force, 20th Air Force, the Space and Missile Systems Center and the Space Warfare Center as subordinate units. The 20th Air Force maintains and operates the Inter-continental Ballistic Missiles (ICBM) and will not be addressed in depth. The 14th Air Force is on Vandenberg Air Force Base (VAFB), California and "manages the generation and employment of space forces to support STRATCOM and the North American Aerospace Defense Command (NORAD) operational plans and missions."[149] The Space and Missile Systems Center is responsible for developing, testing, acquiring and sustaining of space launch, command and control, missile and satellite systems. The Space Warfare Center is responsible for integrating space systems and capabilities into Air Force operations.

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147 United States Marine Corps, "Strategy and Plans," par. 1 [U.S. Marine Corps website] (cited 1 August 2005) ; available from World Wide Web @ http://hqinet001.hqmc.usmc.mil/pp&o/PL/PLI.htm

148 Redifer, S.E. *Marine Corps' Space Cadre Update Brief*, (Washington, D.C.: 2005), 23.

149 U.S. Air force Space Command, "Air Force Space Command," par. 5 [Air Force website] (February 2005 [cited 1 August 2005]); available from World Wide Web @ http://www.peterson.af.mil/hqafspc/Library/Library.asp

Fourteenth Air Force will be the focus of this chapter's Air Force space organizations. The mission of the 14th AF is to control and exploit space for strategic, operational and tactical areas of operation. The critical missions of the 14th AF are Space Superiority, Command and Control of Space Forces, Space Launch and Range, Satellite and Network Operations, and Surveillance, Warning and Battlefield Characterization. The 14th AF is made up of a Joint Space Operations Center and five wings.[150]

The Joint Space Operations Center is a 24-hour command post at VAFB that is responsible for continuous command and control of space forces. The Space Operations Center "conducts space combat planning and directs space combat operations across the spectrum of conflict by planning, tasking, synchronizing, integrating, and assessing execution of assigned and attached worldwide space forces."[151]

The five Wings in the 14th AF are the 21st Space Wing (SW) at Peterson AFB, Colorado, 30th SW at Vandenberg AFB, California, 45th SW at Patrick AFB, Florida, 50th SW at Schriever AFB, Colorado and 460th SW at Buckley AFB, Colorado. The 30th SW and the 45th SW conduct and support preparation and launch operations from Vandenberg AFB and Cape Canaveral Air Force Station, Florida respectively. The 30th and 45th SWs also support testing of submarine missiles and ICBMs.[152]

The 50th SW operates satellite command and control and remote tracking stations. The 50th SW manages the eight tracking stations that make up the Air Force Satellite Control Network (AFSCN) and they support and operate the Fleet Satellite Communications System UHF Follow-on, the Milstar, NATO/Skynet, Defense Satellite

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150 14th Air Force, "About 14th Air Force," par. 4 [Air Force Website] (February 2004 [cited 1August 2005]); available from World Wide Web @ http://www.vandenberg.af.mil/%7Eassociates/14af/about_us/index.html

151 Ibid., par 6.

152 14th Air Force, "About 14th Air Force," par. 7 [Air Force Website] (February 2004 [cited 1August 2005]); available from World Wide Web @ http://www.vandenberg.af.mil/%7Eassociates/14af/about_us/index.html

Communications System (DSCS), the Defense Meteorological Support Program (DMSP), the Defense Support Program (DSP), and the Global Positioning System satellite constellations.[153]

The 21st SW provides global missile warning and space control to NORAD and STRATCOM. "The wing provides early warning of strategic and theater ballistic missile attacks and foreign space launches." The wing also detects, tracks and catalogs more than 10,000 man-made space objects orbiting the Earth. The global presence of the 21st SW is maintained via 26 squadrons located at more than 20 sites worldwide.[154]

The 460th SW provides satellite communications support and signal testing and analysis for the DoD, academic communities and non-military government agencies. The communications networks supported by the 460th SW are critical to the operational readiness of more than twenty five active, Reserve and National Guard units from every branch of service in the DoD.[155]

The Air Force does not delineate between their Missile and Space career paths. Space and missile experts, or 13S personnel, rotate to assignments throughout the space and missile defense organizations. The Air Force designates personnel in different functional areas within the space and missile community and the Air Force as a whole. The Air Force space professionals may also be personnel in the Science (61), Engineering (62) and Acquisition (63) functional areas. The Air Force billets corresponding to these specialty areas are filled based upon personnel education, training and experience. The science, engineering and acquisition personnel move to different assignments throughout the Air Force and might not perform 61, 62 or 63 code-related functions in the Space and Missile Operations community for the entirety of their career.[156]

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153 14th Air Force, "About 14th Air Force," par. 10 [Air Force Website] (February 2004 [cited 1August 2005]); available from World Wide Web @ http://www.vandenberg.af.mil/%7Eassociates/14af/about_us/index.html.

154 Ibid., par. 8.

155 Ibid., par. 12.

156 Interview with LTC Lawrence E. Halbach, Monterey, CA, 18 May 2005.

In comparison with the Air Force, the Army Space career field has FA40A space operations officers and a handful of FA40C astronauts who will never work in FA40 space operations organizations. The Army, like the Air Force, does not have dedicated science, technology and acquisition personnel in the career field. The Acquisition community is a separate career field across the entire Army. Both Services would be well served to develop an acquisition and science personnel pool within their respective space communities that work solely in the space mission area.

E. A FUTURE SPACE FORCE

The underlying theme of the Joint and Service activities in the Space mission area has a long-term, future focus; this section will address the possibility of the establishment of a U.S. Space Force. The Space Commission Report of 2001 specifically addressed the space organizations within the Services and how they could more effectively employ space systems "in independent operations or in support of air, land, and sea forces to deter and defend against hostile actions directed at the interests of the United States."[157]

The recommendations from the Space Commission Report for improved Services' efficiency in space operations resulted in the Air Force being designated as the Executive Agent for Space in DoD. The report's recommendation also resulted in Air Force Space Command separating from the dual-hatted command structure it shared with the Commander, USSPACECOM. These recommendations and subsequent changes were near term realignments.

The Space Commission Report also presented midterm and long-term recommendations for increasing the Services' space operations capability through organizational realignment. The long-term approach identified the establishment of a Space military department or Space Service within DoD. A mid term approach considered the establishment of a Space Corps within the Air Force. These are revolutionary considerations and they are even more interesting when one considers

157 Commission to Assess the United States National Security Space Management and Organization, *Executive Summary: Report of the Commission to Assess the United States National Security Space Management and Organization*, (Washington D.C.: US Government Printing Office, 2001), 33.

almost all of the recommendations from the Space Commission Report were implemented. The Space Commission became the roadmap for aligning military space organizations for the future.

Some members of the Army space community believe the establishment of a separate Space Force is a function of when, not if. One of the reasons the Army would advocate this action is the belief that space support to the Joint Force Land Component Commander (JFLCC) would improve with a Space Force. Currently, the Joint Force Air Component Command (JFACC) will be the Space Coordinating Authority (SCA) in the Joint Theater of operations. Space support will likely be well coordinated and tailored to meet JFACC requirements. It is not likely the JFLCC will enjoy the same level of space support. If a Space Force were established, a Joint Force Space Component Command (JFSCC) would plan, integrate and execute space support for the Joint Force, not primarily for the JFACC. The Space Commission may have recommended organizational changes that will in fact facilitate a Space Force:

> The commission stopped just short of calling for a separate U.S. Space corps or U.S. Space force, and instead put all the pieces in place to quickly create one of these organizations if the Air Force doesn't successfully perform the Space mission. If you step back and look at the commission's recommendations, you see they have put all the structure in place to quickly create the U.S. Space force. The Undersecretary of the Air Force would become the Secretary of the Space Force, the National Security Space Office would become the secretariat staff and AFSPC becomes the service staff and forces. The budget has also been created through designation of the Space military funding program 12.[158]

The Army would benefit by reassessing its current space force organizations regardless of the emergence of a future U.S. Space Force. The proposed Army space missions, existing space organizations, leadership, force structure, FA40 manpower allocations and the proper echelon for tactical Army space support are issues that will affect the future organization of Army space assets.

Prior to the Space Commission report of 2001, the topic of a separate Space Force was being discussed at the highest levels of the military and national politics. New

158 Collins, Glen C. "Letter to the Editor: Time for a new Space Force," *Army Space Journal*, Spring 2005, 57.

Hampshire Senator, Bob Smith, wrote, "If the Air Force cannot or will not embrace space power…, we in Congress will have to establish an entirely new Service."[159] The Air Force focus on aircraft acquisition, airpower doctrine and the career progression of pilots and airmen has dominated the space mission area.

Many in DoD and the government believe that "space power can only reach its full potential through an independent space force, free from control by land, sea and air commanders, led by space commanders possessing specialized expertise."[160] In a pilot-dominated Service, space will always be the second priority to air power. This priority ensures space capabilities will not progress to an equal degree as that of air power capabilities. This is not an Air Force Service problem nor is it an Air Force-Unique mindset. Space operations enable all Service and Joint operations. If space power is not a front-burner focal area of the Air Force, all of the Services' warfighting operations will not be optimally enabled.

The Army as well the Navy and Marines all have varying degrees of the problem discussed in the previous paragraph. The Army leadership is not going to be supportive of increasing spending on space systems when large, billion-dollar programs such as the new self-propelled howitzer, the Crusader, or the newest helicopter, the Comanche, are cancelled. Similarly, the Navy will focus on new or upgraded sea power systems. The Army argues that because space is a Joint mission area and the Air Force is the Executive Agent for space, the Army should not be stripped of funding for its ground systems to focus on space systems and capabilities. Similarly, the Air Force should not be stripped of funding for aircraft to pay for Joint space systems.

The Space Commission did not recommend a separate Space Force be established, but the recommendation seemed to be based on timing, not an inherent lack of plausibility. The Space Commission found "there is not yet a critical mass of qualified personnel, budget, requirements, or missions sufficient to establish a new department."[161]

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159 Moorehead, Richard, "Will We Need a Space Force?" *Military Review*, July-August 2004, 50.

160 Ibid.

161 *Executive Summary: Report of the Commission to Assess the United States National Security Space Management and Organization*, 53.

Long-term evolution of the space mission area may provide that critical mass. Failure by the Air Force as DoD's Executive Agent for space may also be this "critical mass" that establishes a separate Space Force. It is not certain this critical mass will in fact emerge, but DoD and the nation would benefit if the Services developed "adequate leadership, personnel, and doctrine to create a solid foundation for a possible future Space Force."[162]

There is an equally compelling argument against almost every reason forwarded for establishing a separate Space Force. The most powerful argument against a U.S. Space Force is it would further remove space operators from Joint and Service combat operations. Adding another layer of bureaucracy with a Space Force will add to the difficulty of integrating space into combat operations. The Army and the other Services all struggle to integrate space, and space integration is done by their own space experts within their respective Service. Integrating space support to Joint/Service combat operations via a separate Space Force would be even more difficult.

Regardless of the outcome concerning a U.S. Space Force, it is important to understand there are political and military factions pushing for the emergence of a military Space Department.

162 "Will We Need a Space Force?" 53.

VIII. RECOMMENDATIONS

A. OVERVIEW

Up until this chapter, this paper has focused on providing a background for Army Space operations through multiple aspects – historical activities, current Army space organizations and missions, Army Transformation, Space Force Design Updates, desired capabilities, personnel, manning requirements, equipment, requirements documents, and sister Service approaches. Chapter VIII presents recommendations and ideas which might enhance the Army's current and future Space mission area performance.

A brief summary of the recommendations follows:

Organization: Separate the mission areas of space and missile defense by restructuring the United States Army Space and Missile Defense Command.

Leadership: Select FA40 officers to command space-centric elements of SMDC at general officer level. Do not limit the leadership of the Space and Missile Defense Command by excluding general officers from any branch of the Army.

Personnel: Do not place six-man Space Support Elements at UEx and UEy levels or FA40s at the RSTA and Fires Brigades.

Materiel: Immediately focus additional personnel and resources on the development of requirements documents for a tactical, ground-based Space Control Negation system in order to equip the 3rd Space Control Company.

Training: Increase the frequency of the Space Operations Officer Qualification Course and increase the number of students from the other Services.

The recommendations are made according to the categories that make up the DOTMLFP (Doctrine, Organization, Training, Materiel, Leadership and Education, Facilities and Personnel) framework. A detailed presentation of these recommendations is in the remaining sections of this chapter. Not all categories of DOTMLFP are represented by recommendations. The recommendations are based on existing

parameters, facts and lessons learned from Afghanistan and Iraq as well as personal opinion. They are presented in an order representing broad, difficult, hard-to-implement recommendations down to comparatively easy-to-adapt recommendations.

Within the next year, SMDC will publish a new Army Space Master Plan and the Space Cadre Strategy from the Space FORMAL process. These documents should be the vehicles that formally address the following recommendation topic areas through a detailed analysis of the DOTMLFP framework.

B. ORGANIZATION

The existing organizational structure of SMDC should be changed. The missile defense and space missions have been linked since the 1940s when emerging ballistic missile defense technology led to space launches. This habitual association has lasted over 60 years and has outlived its usefulness.

The SMDC is the lead Service for the Missile Defense Agency (MDA) effort to field a Ground-based Mid-course Defense (GMD) System, the command element for operational GMD and Space units, and the Army Service Component Command for STRATCOM. Aside from these areas of responsibility, SMDC also performs significant activities as an Army Major Command (MACOM), oversees a vast Research Development and Acquisition organization, several test and evaluation ranges inside and outside the continental U.S. and the only Battle Lab outside of the Training and Doctrine Command (TRADOC). Former Army Vice Chief of Staff, General Ronald Griffin assessed the wide array of tasks and responsibilities that faced the Command:

> the command carried out 'responsibilities in scope and magnitude unlike any other Army organizations.' It had 'a significant operational mission in support of the warfighting CINCs' because it was the Army component of the U.S. Space Command. In its role as 'an executive agent for the Ballistic Missile Defense Organization' it has 'a complex array of funding and tasking responsibilities,' and 'is directly responsible to the Army Acquisition Executive' regarding acquisition matters. In the course of 'accomplishing these missions, the command works with numerous non-departmental agencies, the OSD staff and other military services.[163]

163 *Seize the High Ground: The Army in Space and Missile Defense*, 254.

General Griffin made these comments about the Army Space and Strategic Defense Command over 10 years ago - before it became SMDC, before the Ballistic Missile Defense Organization became MDA, and SPACECOM merged into STRATCOM. Today these diverse activities and concerns have multiplied and will continue to do so. The best way for the Army and SMDC to meet these command responsibilities is to separate the mission areas and increase resources and command focus on them.

This can be achieved in several ways. The most dramatic way of doing this is for the Army to establish an Army Space Command separate from SMDC. A separate MACOM could be established for each mission. The functional specific organizational structure would be assigned and aligned with their respective command. The biggest improvement in such realignment is the competing demands for manpower, funding and command focus would be eliminated. A command would exist solely for the accelerated development of the space mission area in the Army.

This approach is not currently warranted. Today's space forces do not require a separate MACOM structure. The total number of FA40s, the Army's Core Space Cadre, is less than 200, and there is only one Space Brigade and one active duty Space Battalion. This does not require a 3-Star command structure. There is simply not enough current operational space force structure to warrant such a sweeping change. Additionally, separating the SMDC RDA (Research, Development and Acquisition) or the test and experimentation directorates along space and missile defense lines would not aid their efforts. Space and missile defense still share common technologies and facilities. Preserving these entities under the Deputy Commanding General (DCG-RDA) enables them to better leverage one another's efforts and resources. SMDC is the Service Component Commander to STRATCOM and the Joint advocate for space and missile defense in Joint and Service forums. The space mission area would not be well served without a 3-star general officer space advocate. In the long-term, such a restructuring of the space and missile defense organizations may be appropriate but in the near-term another restructuring approach is more advantageous.

A more suitable change would be to establish additional DCGs under the 3-star MACOM. The current structure shown in Figure 1 (see page 14) could be realigned and augmented, achieving an improved focus and efficiency in the mission areas. A DCG for Space Operations (DCG-SO), a DCG for Missile Defense Operations (DCG-MD) and a directorate for Information Operations should be established while preserving the DCG for RDA. The operational elements under the current, single DCG-O organization structure would be realigned accordingly. The Future Warfare Center would remain as a separate subordinate directorate that answers directly to the main command group as opposed to one DCG. The Combat Development Directorate would not work directly for the FWC and the technology developers. An organizational chart of such a structure is shown at Figure 32.

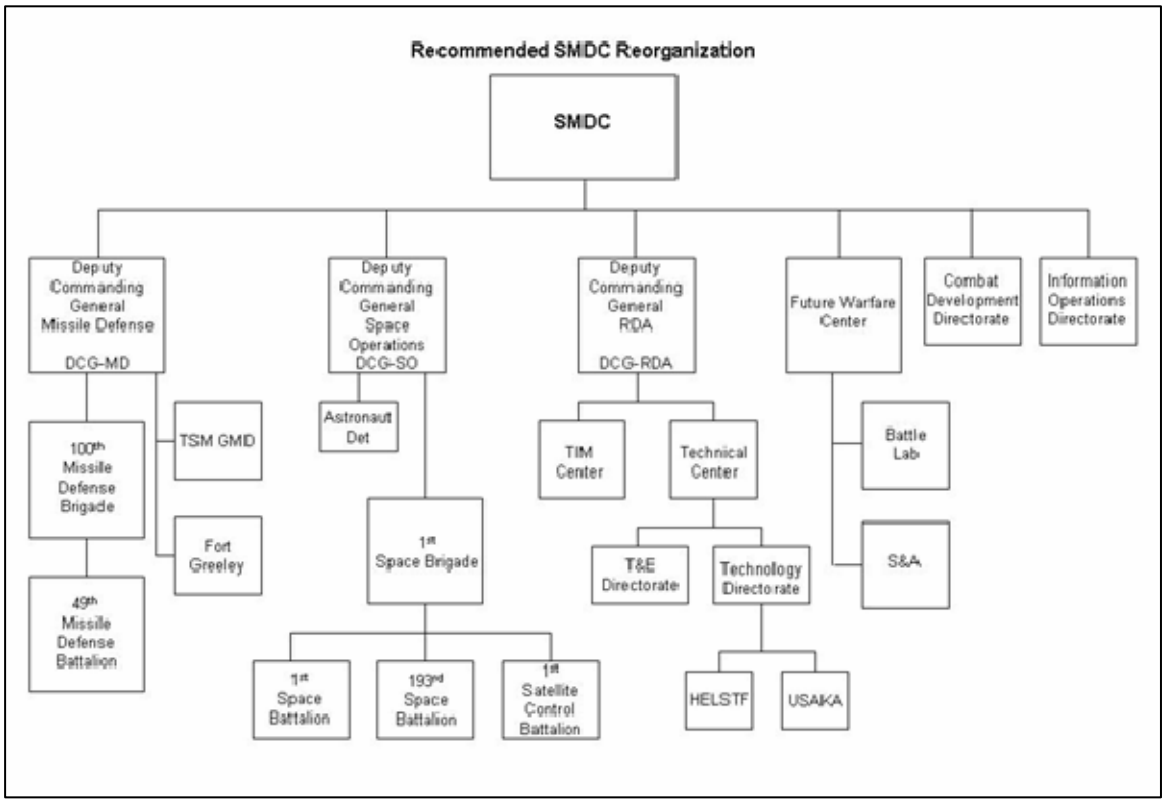

Figure 32. Recommended SMDC Organization Chart

This reorganization and realignment would facilitate growth in the space mission areas as a separate DCG and staff could focus on manning, training and equipping existing and emerging operational units. This also focuses the assignment of FA40s, as all FA40s would work in the DCG-SO except for a small number on the MACOM staff

and in the FWC, CDD and the DCG-RDA. This is in step with the Army Transformation, which reduces the large staff elements in headquarters and focuses manpower in the operational units.

This restructured organization would functionally align with USSTRATCOM. The Commanding General of SMDC is the Joint Functional Component Commander for Integrated Missile Defense (JFCC-IMD). The CG and the DCG-MD would focus on this mission area while the DCG-SO and the Army space directorate at STRATCOM would be the Command's lead in all JFCC Space and Global Strike activities. Similarly, the Information Operations Directorate and the Army space directorate at STRATCOM would be the lead integrator for Army IO into JFCC Network Warfare operations. This would enable the SMDC CG to engage in the three mission areas of missile defense, space and IO with general officer representation. This structure would better allow the CG to focus his activities at STRATCOM as the JFCC-IMD, while still maintaining DCG and IO Directorate interaction with their respective STRATCOM injection points.

Establishing a separate DCG command structure with Space as a stand-alone element also sets the foundation for a possible future merger of the Army and other Services' Space forces into a U.S. Space Force. The Space Commission Report discusses the establishment of a U.S. Space Force:

> The Department of Defense requires space systems that can be employed in independent operations or in support of air, land and sea forces to deter and defend against hostile actions directed at the interests of the United States. In the midterm a Space Corps within the Air Force may be appropriate to meet this requirement; in the longer term, it may be met by a military department for space.[164]

Untangling the organizational structure of the space and missile defense organizations will streamline any future restructuring of Joint and Service space forces. The former Director of the Force Development and Integration Center in SMDC was quoted in the Army Space Journal reference the possible establishment of a Space Force.

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164 *Executive Summary: Report of the Commission to Assess the United States National Security Space Management and Organization*, 33.

Regarding the possibility of a U.S. Space Force, COL (R) Glen Collins wrote in terms of an impending activation, "...it should be assumed that there will be a creation of a U.S. Space Force, and that the only remaining question is when."[165]

For these reasons it is in the best interest of Army Space and the Army as a whole to realign the Space and Missile Defense Command and establish a Deputy Commanding General - Space Operations (DCG-SO).

C. LEADERSHIP

The DCG – Space Operations should ideally be promoted from the FA40 career field to leverage the training, education and space expertise invested in the FA40 community. Command of SMDC or assignment as the DCG – Space Operations should not be limited to Air Defense Artillery officers. This has largely been the case with exceptions such as GEN(R) Edward Anderson who commanded SMDC from 1996-1998. General Anderson was a Field Artillerymen and an exception to the consistent theme of having Air Defense Artillery officers becoming the SMDC Commanding General. However, there are currently no general officers that have been promoted from the FA40 Career Field. This may change in the future, but selecting general officers who are not necessarily from the Air Defense Artillery branch to command SMDC may help the space mission area and the FA40 community.

Changing this paradigm is consistent with the Space Commission Report recommendation that the Secretary of Defense "end the practice of assigning only Air Force flight-rated officers to the position of CINCSPACE and CINCNORAD to ensure that an officer from any Service with an understanding of combat and space could be assigned to this position."[166] Similarly, any officer, regardless of their parent branch in the Army should be considered for command of SMDC or assignment as the DCG-Space Operations.

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165 Collins, Glen C. "Letter to the Editor: Time for a new Space Force," *Army Space Journal*, Spring 2005, 57.

166 *Executive Summary: Report of the Commission to Assess the United States National Security Space Management and Organization*, 33.

Missile Defense is enabled by space; it is not the purpose of space operations. In-depth knowledge of Air and Missile Defense is not equivalent to space expertise. This is why the FA40 career field was established. Ceding SMDC command to officers with Air and Missile Defense backgrounds serves the missile defense function of the command very well, but that same certainty cannot be applied to the space side of the MACOM.

D. PERSONNEL

The low-density FA40 population should not be distributed in an uneven manner. 30% of the FA40 population should be in each of the three levels of Army space billets with 10% of the personnel participating in schools/training opportunities. The greatest draw of personnel that will distort this balance is the SSEs at the UEx and UEy level. The Army space community should not allocate more than a third of its population to the SSEs.

With very few FA40 unique tasks being conducted by Space operations officers on the Division staff elements, an objective strength of six FA40s per SSE is overkill to augment staff functions already being performed by other staff officers. Lessons learned from Operation Iraqi Freedom and the 3rd Infantry Division SSE indicate that the areas resulting in "much combat-value added" were theater and global reachback to space products and services, support to Blue Force Tracking (BFT), and support to imagery and topography.

Examples of theater and global reachback of the SSE for space products include accessing the Commercial Exploitation Team in theater or the Spectral Operations Resource Center (SORC) in Colorado Springs for panchromatic and spectral imaging and limited analysis. The global reachback capability resident in an organic SSE is the only space-unique task considered of "much combat-value added" by the 3rd Infantry Division's SSE in Iraq. Identifying and monitoring the use of BFT devices and their architectures and the provision of existing imagery were also considered tasks with "much combat-value added", but both are SSE enhancing tasks. Another staff section is conducting their day-to-day operations and leveraging the SSE to improve their performance. Access to these data and communications architectures could be achieved with improved network connectivity of existing staff elements.

An ARSST team deployed to support Operation Iraqi Freedom throughout 2004 worked with several Joint and Coalition units in a variety of ways to enhance their operations. The ARSST supported the 1st Marine Expeditionary Force (MEF) and trained Marines on the Blue Force Tracking (BFT) devices that were available and how the BFT architecture worked in-theater. The ARSST also worked the fielding and distribution of BFT devices to US and United Kingdom (UK) Special Operations Forces and the UK Joint Helicopter Force and ensured the BFT devices were inserted into the theater's Joint Restricted Frequency List (JRFL). The ARSST trained the coalition and US soldiers on installation, use and troubleshooting of the BFT devices and assisted in connectivity of those BFT devices to the common operating pictures. The ARSST advised the 1st MEF on how to mitigate the effectiveness of Iraqi GPS jamming operations. Use of three-dimensional (3D) fly-through simulations for mission rehearsals on the SATURN communications suite was very valuable. Access to updated commercial imagery thru the Commercial Exploitation Team and reachback were also areas of value-added space activity.[167]

The ARSSTs and SSEs have basically the same equipment and personnel. Much of the value-added by these teams is made possible through connectivity in-theater and reachback to U.S. based operations centers. Their functions could be provided without UEy SSEs at Corps and above, with 4-man UEx SSEs at Divisions, and without space operators at any brigade. Value added to these organizations comes primarily from information that is already available or available upon request, not from space-unique tasks performed by FA40s.

The ARSSTs and the organic SSEs in particular prepare and input space relevant information and planning considerations into staff estimates, operations plans, fragmentary orders and warning orders for their supported headquarters. The UEx SSE prepares a Space Support Annex to the Division's operation order.

Several steps should be taken to reduce the number of FA40s currently being assigned to Corps (UEy), Division (UEx) and Brigade (UA) staffs. SSEs should not be

167 Story, Kurt, Army Theater Space Support in Joint Operations Brief, (Colorado Springs, CO.: 2005), 22.

assigned as an organic asset at Corps and above (UEy). Corps headquarters already have an FA40 Space Operations Officer assigned to their staff. If more robust space support is required at a Corps headquarters or higher, an ARSST should be attached to provide that augmentation.

SSEs at division-level should be reduced to two FA40s and two communications NCOs and FA40s should not be assigned to RSTA and Fires Brigades. The Army space community will always focus on tactical space support, but utilizing the preponderance of the FA40 population at corps, division and brigade-level organic staff elements is redundant and not proportional to the added combat-value. Dedicating close to 50% of the FA40s to enhance staff activities that are the responsibility of other sections should not be the primary use of a limited personnel asset such as the FA40s.

The FA40 community should enhance performance in the Operational/Service and Strategic/Joint levels of the FA40 billets by developing FA40 acquisition officers and engineers. Having acquisition specialists and engineering expertise would allow the Army space community to better fill positions in the Joint and Service Space Program Offices, Army and Joint R&D and S&T facilities and in the Army Program Executive Office – Space. The Army space community currently has no dedicated acquisition support from officers who have come from the FA40 career field. Acquisition officers come from every branch of the Army and may or may not have any experience and understanding of Army space operations. Integration of Army space requirements into Joint space programs would be greatly enhanced if the FA40 community developed a Space acquisition and engineering force.

The Army has assessed roughly ten individuals per eligible year group into the FA40 career fields. This has historically taken place at the ten-year point in the officers' career. Future assessments of FA40s may occur earlier in the officers' career and may increase in number. With an average of ten incoming FA40 officers yearly, one officer should be sent to receive an advanced degree in engineering and DoD acquisition certification. This would ensure Army-unique space interests and requirements are integrated and protected in the Joint and Service R&D, S&T and acquisition functional areas.

E. MATERIEL

The Army should develop Service operational requirements for a tactical, ground-based Space Control Negation system. Such a requirement should be developed with a full compliment of Air Force, Navy, and Marine combat developers reviewing the documents and providing input and their Service-unique requirements. The Army and Marines are the only Services focusing on space support to tactical ground forces. The Army should establish a valid requirements document for a mobile, ground Space Negation system. Such a capability requirement is commensurate with the established Joint and Service doctrinal publications that specifically identify Space Control as an Army mission area.

The force structure for the Army Space Control Company is already at the 1st Space Brigade. The organizational construct is in place for the Space Control Company and the Space Control Company is assigned the mission. The missing pieces are the operational concept and the requirements documents for such a system. A Space Control requirements document might logically become a Joint requirements document, but as the Service focused on mobile, ground-based, tactical space control, the Army space community should initiate the requirements development effort at SMDC and get the other Services to review and provide input.

An Army Space Control system could be used globally to support Service, Joint and Coalition operations. The 1st Space Brigade would be a force provider to STRATCOM to support JFCC-S&GS missions. The Army needs to use its existing space control force structure in the 1st Space Battalion and an approved space control requirements document as a forcing function to validate the Army and Joint doctrinal publications that identify Space Control as an Army mission. SMDC and their CDD need to present Army leadership with a decision brief which commits the Army to supporting the development of a space control system. The Space Control mission is defined as an Army function in Joint and Army doctrine, Army Space Policy, and the Space Commission Report. The Army has already approved space control force structure in the 1st Space Battalion. Presented with this backdrop, the Army needs to approve space control requirements documents via the Army Requirements Oversight Council and

support these documents progression to a Joint Requirements Oversight Council. If Space Control is an Army space function, the Army or Joint program offices need to equip the operational units who are responsible to execute this mission.

A Space Control system requirements document should not focus on current technology developments but on a future capability. This capability should include a sensor-to-shooter capability. A Space Control System capability should include mobile Space Surveillance and Negation capabilities, the sensor-to-shooter pair. To date, the Army has one initial validated Space Control System requirements document, a counter-communications satellite Initial Capabilities Document (ICD). This merely validates an initial concept. An approved ICD for a counter-SATCOM system is literally years away from a Capabilities Production Document that would actually produce such a system. Development of the complete set of Space Control System requirements documents (ICD, CDD and CPD) should be the top priority for the Combat Development Directorate and one of SMDC's top priorities as well.

Developing these documents are best achieved by separating the requirements developers from the technology developers in the FWC as was depicted in the restructured organization chart (Figure 32) shown earlier in this chapter. Army requirements development is a slow process that lags behind technology development. If the Combat Developments Directorate works for the FWC, the Technology Center and the Battle Lab, requirements development will focus on validating the existing technology projects that are ongoing rather than developing future operational requirements. SMDC is one of the only Commands in the Army and DoD where the requirements development personnel work for the acquisition and technology development directorate and this should be changed.

The number of requirements development FA40s for the entire space mission area consists of one or two action officers augmented by a handful of DACs and contractors. An FA40 Colonel should lead the requirements development team for the Space mission area. At least one FA40 LTC and three FA40 Majors, augmented by an equal number of DACs and contractors should be assigned to work requirements development for a Space

Control System. This level of manning would enable an appropriate level of interaction and staffing with sister Services, Department of the Army and Joint Staffs, and other Joint and Service technology development centers.

F. TRAINING

The Army space community should ensure all officers assessed into the FA40 career field attend the Space Operations Officer Qualification Course within one year of entry. The course is currently taught on an average of twice a year. The frequency of the course should be increased to three times per year until the backlog of officers waiting to attend has been reduced to the number of an average class size. The backlog exists because multiple year groups of officers entered the FA40 Career Field when the opportunity became available in 1998. The Space Operations Qualification Course is attended by active, reserve and National Guard personnel. SMDC should strive to schedule as many students from other service branches as possible. Increasing the Joint nature of the classes will increase the student's understanding of the Joint nature of the Space mission area.

Establish a memorandum of agreement with the Army's proponent for Information Operation, TRADOC, to send FA40s to formal IO training. FA40s located at ARSTRAT who are performing duties associated with ARSTRAT's role as the Army lead for IO to STRATCOM need to attend the initial FA30 IO training. The FA40 training branch needs to incorporate formal Army IO training into the FA40 Qualification Course if SMDC/ARSTRAT is to adequately meet the responsibilities as the Service lead for IO integration at STRATCOM.

If ARSTRAT/SMDC remains the Army's lead role at STRATCOM for IO, the command should request through TRADOC and DA to be recognized as the Army's proponent for IO. Assignment of proponent duties would result in additional funding and resources to adequately perform IO integration for STRATCOM. Denial of Information Operations proponency by TRADOC and DA would at least highlight the need for the Army's IO proponent to assume an increased role at STRATCOM. Using FA40s to lead IO integration in unified commands is not a proper use of these space personnel.

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